Apple IIgs Owner's Guide

Preface - The Incredible Stretching Machine

The Apple IIgs is a direct descendant of the Apple I the creation of an engineer who hated so much to leave his computer behind at the end of the workday that he made himself a home computer.

Steve Wozniak, the engineer, showed the machine to his friend Steve Jobs, and they showed it to other engineers and computer enthusiasts at the Homebrew Computer Club. It wasn't much to look at. It didn't have a case or a keyboard or a matching monitor, but no one saw what it wasn't. They saw what it could be, and they all wanted one.

So Wozniak and Jobs started building computers for their friends. And those friends started building cases for their naked circuit boards and writing programs that stretched the machine to its limits. Except that the limits kept expanding.

The first machine was built to grow, and it's still growing. The memory size, for example which determines how elaborate a program can be and how big a document can be has gone from 4K on the Apple I to 256K on the Apple IIgs. And when you need more memory, you can stretch that 256K beyond 8 megabytes.

Despite the considerable difference in memory size and other features, most of the programs originally designed for the first generation of Apple computers can run on the Apple IIgs. It's not a coincidence. It's the result of a commitment to compatibility among the computers in the Apple II family. And it's the reason you have so many programs, printers, and other Apple products to choose from today.

You'll learn how you can use those programs and products to stretch your machine as you go through the training disk and the books that came with your Apple IIgs.

Learning By Doing

The best way to get acquainted with the Apple IIgs is to use it that's the purpose of Your Tour of the Apple IIgs, the interactive training disk that came packed with your Apple IIgs. The owner's guide expands on the concepts presented on the training disk, but neither the guide nor the disk can tell you exactly in a step-by-step way how to use your computer to write reports, do financial planning, or create graphics. The step-by-step instructions come with the programs you buy for your computer. The fascinating (and initially confusing) thing about computers is that how they work depends on what you use them for.

If you have any questions that other manuals don't answer, come back to this manual for help. If you can't find the answer here, your best resource is a more experienced Apple user. If you don't know such a person, consider joining an Apple user group in your area.

Road Map to the Manuals

Your Apple IIgs came with several books: Setting Up Your Apple IIgs, the Apple IIgs Owner's Guide, the Apple IIgs System Disk User's Guide, and A Touch of Applesoft BASIC.

If you haven't done so already, read the setup guide to get your computer set up, and then start reading this book. Not the whole thing just enough so you feel comfortable with your new machine. What you do after that depends on whether you want to use a program (for writing, calculating, list making, drawing) or whether you want to write programs yourself.

You can buy programs to accomplish almost any task you can think of (and many you can't), so

you don't need to write programs unless you want to; but many people prefer writing programs to
using those available. If you think you might be one of those people, read A Touch of Applesoft
BASIC. If you're content to leave programming to programmers, skip the introduction to BASIC
and read the manual that came with one of the programs you got to use with your Apple IIgs.

The system disk documentation explains how to use the programs on the Apple IIgs System Disk.
You'll use the System Disk to prepare blank disks for storing documents, to make copies of
important disks, to delete documents you don't need any more, and to switch quickly from one
program to another. A program that lets you copy, delete, and otherwise manipulate documents is
called a utility program. Read the system disk documentation when you're ready to start using a
program to create documents.

These manuals are designed for people who plan to use the Apple IIgs for writing, budgeting,
record keeping, and things like that.

Chapter 1 - Meet Your Apple IIgs

This chapter defines some essential computer jargon words like hardware, software, application
program, and peripheral device. Then it shows you how to start up the Apple IIgs training disk.
After that, you'll get a chance to use the Apple IIgs's built-in Control Panel Program a
program that lets you customize your computer system much the way you adjust the seat position
and mirrors to customize a new car.

All of these topics are covered in more detail later in this guide.

Application Programs

What you do with your computer depends on the software you're using with it.

Software refers to the sets of instructions, called programs, that tell the computer what to
do. A program designed for a particular purpose, or application, is called an application
program, or just an application.

You can write programs yourself, or you can choose from a library of over 10,000 applications
that are available for the Apple II family of computers.

Applications are stored on disks. You start up an application by putting an applica-tion
program disk in a disk drive and turning on the computer's power.

Disk drives play back information stored on disks much the way tape players play back the
information on tape cassettes.

Disks

You can use two kinds of disks to start up application programs on the Apple IIgs: 3.5-inch
disks and 5.25-inch disks. The main difference between the two types of disks is storage
capacity: 3.5-inch disks can hold 800K (about 400 pages of text); 5.25-inch disks can hold 143K
(about 70 pages of text).

Hard disk: You can also start up Apple IIgs applications from a hard disk.

The standard information storage medium for the Apple IIgs is the 3.5-inch disk because it is
compact and sturdy, and has almost six times the storage capacity of a 5.25-inch disk. But the
Apple IIgs works just fine with 5.25-inch disks, so if you have a library of them, there's no
reason not to use them with the Apple IIgs. The impor-tant thing is that you have the right
kind of disk drive to match your disks.

Besides using disks to start up applications, you'll use disks to store documents. Document is a generic term for anything you create with an application. It could be a memo, a budget, a graph, a picture, and so on.

Initially, application program disks are more valuable than the blank disks you buy for storing documents; but once a disk has your documents on it, it becomes as valuable as the time you spent creating the documents. That's why it's important to take good care of disks. Read about the care and handling of disks in the manual that came with your disk drive. And keep these points in mind:

Make backup copies of important disks. Copying disks is explained in the system disk guide.

Keep disks away from hot places (like the dashboard of your car on a sunny day).

Keep disks away from magnets (and devices like telephones that use magnets).

Protect disks from dust. (Store them upright and covered, either in a plastic disk holder or in a shoe box.)

Keep disks dry. (Don't water plants over them or get sloppy with your coffee.)

Peripheral devices

In addition to the software that tells your computer what to do, you need hardware that lets you see what you're doing (a monitor), save and retrieve what you've done (a disk drive), and print a copy of your work (a printer). Accessories like these, that plug into your computer, are called peripheral devices.

Peripheral Devices

There are two ways to connect peripheral devices to the Apple IIgs. Some devices are designed to be plugged into a particular port on the back of the computer. Other devices are designed to be plugged into a slot inside the computer. If the device requires an interface card, it's designed to be plugged into a slot.

Starting Up

The quickest way to get comfortable with your Apple IIgs is to start using it. That's the purpose of the Apple IIgs training disk. Before you start up the training disk, you need to identify your startup disk drive. The startup drive is the drive where the computer will look for a startup disk a disk with an application it can start up with.

If you have only one drive, it's your startup drive.

If you have two or more drives of the same type (both 3.5-inch drives or both 5.25-inch drives), the startup drive is the drive connected directly to the disk drive port.

If you have both a 5.25-inch drive and a 3.5-inch drive connected to the disk drive port, the 5.25-inch drive is your startup drive. If you want the computer to start up from a disk in your 3.5-inch drive (which you do if you plan to use the Apple IIgs training disk), make sure your 5.25-inch drive is empty. When your computer can't find a disk in the 5.25-inch drive, it will check the 3.5-inch drive next. Depending on whether the majority of your application program disks are 3.5-inch or 5.25-inch, at some point you might want to use the Control Panel Program to change the startup drive.

If you have two drives of the same type connected to a disk drive controller card, the startup

drive is the drive attached to the connector labeled drive 1 on the card.

If you have drives connected to more than one controller card, the startup drive is the drive connected to the card in the highest-numbered slot. If you want, you can change the startup slot by using the Control Panel Program.

The Training Disk

The training disk is designed to give you first-hand experience using the computer for writing, calculating, record keeping, and drawing. The programs you'll use are simulations of application programs; you won't be able to use them to write your own letters, create budgets, or set up inventories, but they'll give you an idea of the sorts of things you can do with your computer. And you'll get to experiment in a controlled environment where a mistake isn't a problem just another learning opportunity.

Besides learning about all the different things you can do with your computer, you'll learn some general concepts that stay the same no matter what you're working on:

    How to control an application by using the mouse or the keyboard
    How your work is saved temporarily in the memory of the computer
    How your work is saved permanently on disks
    How to retrieve work you've saved on a disk
    How to edit your work

And, for the adventurous, there's an introduction to programming. You'll get a chance to see what goes into writing the instructions that control the behavior of the computer how to give the computer its personality as a writing machine, an adding machine, a game machine, and so on.

Important   In order to use the Apple IIgs training disk, you need a monitor and at least one 3.5-inch disk drive connected to your Apple IIgs. If you are using a regular television set as a display device or if your only disk drive is a 5.25-inch drive, you won't be able to use the training disk, but you can get the information from Chapters 2 and 3.

You can use a television set as a display device with many game and educational applications, but the picture you get with a regular TV set isn't clear enough for applications that display 80 characters per line. Some TV sets are designed to work as monitors. If you have a combination TV/monitor, you will be able to use the training disk.

Starting up the training disk

Find the disk labeled Your Tour of the Apple IIgs and follow these instructions to start it up.

Put the disk into your startup drive.

Turn on your monitor.

Reach around the left side of the computer and find the power switch on the left side of the back panel. Turn it on.

If everything is plugged in and turned on, in a few seconds you should see the opening display of the training disk.

Put the book aside now and enjoy the hands-on introduction to your Apple IIgs. Anything you need to know to use the disk will be explained right on the screen.

Problems starting up?

If you don't see the opening display, go through the following checklist to see if you can identify the problem:

Important   If the problem seems to involve a loose connection, turn off the power and wait at least 30 seconds before you reconnect cables.

Is the computer plugged into a power source?

Is the monitor plugged into a power source?

If your computer and monitor are plugged into a power strip, is the power strip turned on?

Is the monitor plugged into the computer?

Is the disk drive connected to the computer?

Is the monitor power switch turned on?

Is the computer power switch turned on?

Did you put the training disk in the 3.5-inch drive connected directly to your computer?

If you have a 5.25-inch drive, was it empty when you turned on the power?

Are you using the right disk? Eject the disk in the startup drive (following the instructions in the next section) and make sure it's labeled Your Tour of the Apple IIgs.

Are the monitor's contrast and brightness adjusted correctly?

If the image on your screen is rolling or out of alignment, hold down Option and Control while you press Reset (the key marked with a triangle). Then press 2. This restores the standard Control Panel settings for the U.S.

If you think there's a more serious problem with your computer, you can run a diagnostic test by pressing Apple key and Option while you turn on the power or by pressing Control-Apple key-Option-Reset if the power is already on. After about 35 seconds you should see the message System Good. If you see the message System Bad followed by a string of letters, contact your authorized Apple dealer.

If you can't identify the problem yourself, get help from a more experienced Apple II user or from your authorized Apple dealer.

Stopping

When you're ready to stop using the training disk, do this:

Choose Let's Stop from the Quit menu.
Push the disk drive eject button.
Take the training disk out of the drive.
Turn off the monitor's power switch.
Turn off the computer's power switch.

The Apple IIgs uses less power than a 100-watt light bulb, so you don't need to turn it off between work sessions.

The ideal way to leave the training disk and any application program is to choose the Quit

option from the menu. Choosing the Quit option gives the application a chance to remind you to save your document (not an issue with the training disk, but a very important issue if you've been using an application for writing or budgeting), and it keeps you from quitting when the application is in the middle of doing something.

Important   If you turn off the computer when the disk drive is reading from or writing to a disk, you could damage the disk and lose the informa-tion recorded on it. Wait until the disk drive light goes off before you turn off the power. If something goes wrong and the disk drive light stays on longer than 45 seconds, you can stop the disk drive by holding down Control while you press and release Reset (the key marked with a triangle).

If an application doesn't give you a Quit option, you can always quit by turning off the power. Just be sure to save your work before you touch the power switch.

Switching applications

Once the power is off, you can start up another application by putting the application program disk in the startup drive and turning on the power, just as you did when you started up the training disk. But you don't have to turn off the computer's power to switch applications. There's a better way (better for the power switch and for the circuitry inside the computer). Instead of turning off the power switch and exchanging the program disks, do this:

Choose the application's Quit option, but don't turn off the computer's power.

Push in on the disk drive eject button, remove the last application program disk you were using, and insert the one you want to use next.

Hold down the Apple key and Control while you press Reset. Then release all three keys, starting with Reset.

If it seems awkward, you're doing it right! If it were more convenient, you might press the keys by accident and restart your application, losing everything stored in memory up to that point.

From now on, when a procedure calls for you to hold down one or two keys while you press another, the keys will be shown joined with hyphens (for example, the Apple key-Control-Reset).

Restarting

Switching applications with the Desktop: You can also switch from one application to another by using the Desktop. The procedure is explained in the system disk documentation.

Control Panel Program

The training disk gave you a feel for using the Apple IIgs. Now, if you want to, you can change the feel of the Apple IIgs to suit yourself by using a built-in program called the Control Panel.

Here are some of the things you can change with the Control Panel:

    The color of the text, background, and border displayed on the screen
    The volume of the built-in speaker
    The responsiveness of the keys
    The responsiveness of the mouse
    The speed of the microprocessor

Microprocessor speed: The Apple IIgs's microprocessor can operate at two speeds: at up to 2.8

megahertz (its fast speed), or at 1 megahertz (the speed of the microprocessor in earlier Apple II's). Fast, the standard setting, is best for most applica-tions, but speeding up an old application could throw off its timing or keep it from running properly. If it does, you can change the speed to 1 megahertz by using the Control Panel.

Most people won't have to change any of the Control Panel settings. The only time you must change a Control Panel setting is:

If you have a peripheral device connected to an interface card in a slot inside the computer instead of to a port on the back of the computer. (Each port on the back of the Apple IIgs corresponds to a particular slot inside the Apple IIgs. Unless you activate the slot by using the Control Panel Program, the computer assumes you want the port to be active.)

If you have both a 5.25-inch drive and a 3.5-inch drive and you want the computer to start up from a disk in the 3.5-inch drive directly instead of first looking for a disk in the 5.25-inch drive.

If you have a printer, a modem, or some other peripheral device connected to the printer or modem port on the back of the Apple IIgs and the device doesn't work with the standard serial port settings.

By the way: Your settings are saved permanently you don't have to set them each time you turn on the power. But you can change them as often as you want by using the Control Panel Program.

Using the Control Panel Program

Learn to use the Control Panel Program by setting the Apple IIgs's built-in clock and calendar. Once you've set the battery-operated clock, you won't have to set it again. The battery lasts between five and ten years.

Hold down Option while you turn on the Apple IIgs power switch. Then type 1 to enter the Control Panel Program. You'll see the Control Panel menu.

Clock display

Oops! If you don't see this display, press Esc (escape) to get back to the Control Panel menu. This time, make sure Clock is highlighted before you press Return. Press Up Arrow if one of the options below Clock is highlighted.

Notice that Month is highlighted. Press Left Arrow or Right Arrow until the number representing Month is correct. (For January, set the month to 1; for February, set the month to 2, and so on.)

Next, press Down Arrow to highlight Day, and then press Left Arrow or Right Arrow until the day is correct, just as you did to set the month.

Next, press Down Arrow to move to Year, Hour, and Minute and set them the same way by using Left Arrow or Right Arrow. (Setting Seconds probably isn't necessary, but you can do that too if you want.)

Press Return to save your settings.

At this point, you should find yourself back at the Control Panel menu with the correct date and time displayed in the box in the upper-right corner of the screen.

If you want to try out some of the other options on the Control Panel, feel free to do it now or later, after you've lived with the standard settings for awhile.

Chapter 2 - Once Over Lightly

This chapter reviews and expands on the computer concepts covered on the training disk. If you already understand how information moves through the computer system and out to peripheral devices, you might want to skip this chapter and go straight to Chapter 3, where you'll learn about using the mouse and the keyboard to control applications.

Starting Up an Application

When you start up an application, that application is copied into the memory of the computer and takes control of the computer system. What you see on the screen and what you can do with the computer depend completely on the application you started up with.

You can also start applications by using the Desktop on the system disk. The advantage of starting applications from the Desktop is that the Desktop lets you copy documents, delete documents, move documents from one disk to another, and do other things that come in handy during a typical session at the computer. The Desktop also makes it quick and easy to switch from one application to another.

Read the system disk documentation for more information.

Communicating with an Application

Applications communicate with you by displaying things on the screen. You communicate with applications by typing at the keyboard or by pointing to choices with the mouse.

Information that travels out of the computer (like the messages displayed on the screen) is called output. Information that travels into the computer (keypresses and mouse moves) is called input.

User Interface

The way an application communicates with you is called the user interface. When you are choosing applications for the Apple IIgs, you should give a lot of thought to the application's user interface because that's the personality of the application.

At one extreme are hand-holding applications that guide you slowly but surely through the application. At the other extreme are applications that give you minimal instructions and leave you to your own devices. If you use an application daily, you probably won't want as much hand-holding as with an application you use only once or twice a month.

Interface is a word you'll see a lot in computer books and magazines. It refers to the way things communicate with each other. It describes both the way information is exchanged between the computer and a peripheral device (for example, serial interface) and the way information is exchanged between the computer and a person (user interface).

How Information is Displayed

Some applications give you a choice of how you want information sent to the display. The choice is 40 columns or 80 columns. To understand what that means, imagine that the screen is a grid 40 squares across by 24 squares down. Each square on the grid can hold one character. In 80-column format, the grid is 80 squares across by 24 squares down. With the 80-column display, you can't twice as many characters per line as with the 40-column display, but the characters are half as wide. Some display devices, like TV sets, can display text only in the 40-column format they don't have sharp enough resolution to display the narrower 80-column characters

clearly.

The 40-column and 80-column formats are two text modes.

A third way that applications can send information to your monitor is in graphics mode. In graphics mode, text and graphics are formed by patterns of dots, or pixels. The more dots used to create a picture, the sharper the resolution. The Apple IIgs can display graphics by using a rectangular array of 640 horizontal by 200 vertical dots. In this mode, called super-high resolution, the dots are so close together that it's hard to tell that the picture is made up of dots.

The Apple IIgs also supports graphics modes developed for earlier models of the Apple II, including double-high resolution, high resolution, and low resolution.
The phrase graphics mode suggests that this way of sending information to the screen applies only to pictures, but graphics mode can also be used to display text. In fact, that's how some word processing applications are able to display text in a variety of sizes and fonts. Instead of using the Apple IIgs's built-in text generator (which'ts characters into the 40-by-24 or 80-by-24 grid), they send numbers and letters to the display as if they were pictures.

Creating a Document

Most of the time, you'll be using the computer to create something: a letter, a graph, a list, a budget. Things you create with the computer are called documents, or files. The kind of document you can create depends on the application you're using. You don't create a letter by using a spreadsheet application, and you don't create a spreadsheet by using a word processing application.

As you type your document, it is stored along with the application in the memory of the computer.

Scrolling

There's a lot more room in memory for a document than there is room on the screen to display it.

How do you move different parts of the document under the screen window? With applications that use the mouse, there's a bar, like an elevator shaft, that runs along the right side of the screen window (and sometimes along the bottom of the screen window as well). As you move the elevator along the shaft, you scroll different parts of the document under the window.

With keyboard-controlled applications (that is, applications that don't use the mouse), you press Up Arrow to see earlier parts of the document, Down Arrow to see later parts of the document, Left Arrow to see the leftmost side of the document, and Right Arrow to see the rightmost side of the document.

Whether you move your document into view with the elevator or the arrow keys, moving the document under the screen window is called scrolling.

Saving a Document

The fact that your document is stored electronically in the com-puter's memory means that it's in a very dynamic, easy-to-edit state. It also means that if you turn off the power by mistake or change applications, you lose the document in memory. That's why it's important to save your work on a disk.

Saving a document on a disk is like'ling a paper document in a'le cabinet. How you save a document on a disk depends on the application. Sometimes Save is an option on a menu; sometimes

you press a combination of keys that tells the application to save your document. (The manual that came with the application will explain exactly how to save your work.)

Once you've saved your document on a disk, it's OK to quit the application and turn off the computer's power. When you flip the power switch, the copy of the document that was stored electron-ically in the memory of the computer is lost, but you can retrieve a copy of the document from the disk any time you want to work on it.

Formatting a Disk

Before you can store documents on a blank disk, the disk has to be formatted, or initialized. (The terms are used interchangeably.) Formatting a blank disk magnetically divides the disk into numbered parking spaces where information can be stored and retrieved.

Some applications have a formatting option on a menu within the application. Other applications expect you to format disks by using the System Disk. You'll learn more about formatting in Chapter 4 and in the system disk guide.

Making a Backup Copy

Once your document is safe on a disk, you can rest easy. It's just like having a paper copy of your document in a file cabinet. The only reason you wouldn't be able to get it back is if you lost the disk or left it in your shirt pocket through a wash-and-dry cycle. This doesn't happen very often, but it always seems to happen the day before an important deadline with work that is irreplaceable. That's why it's a good idea to save the same document on two separate disks (or on three or four separate disks if the document is really important).

Some companies go so far as to store backup copies of important disks in a safe off the premises. The least you should do is keep your backup copy far enough from the original so that one cup of coffee can't reach both in one spilling.

You can make backup copies in two ways. You can save the document while you're using the application program, eject that disk, then save the document again on a second disk. Or you can copy the document onto a second disk after quitting the application by using the System Disk.

You should also make backup copies of your applications. However, don't be surprised if you can't duplicate every application you buy. Many manufacturers copy-protect (make it impossible to copy) their disks to protect themselves from software pirates, who illegally duplicate and distribute their applications. If you can't copy an application, the manufacturer generally provides one backup copy or tells you how to replace a damaged application program disk at a nominal cost.

Editing a Document

To edit a document that's stored on a disk, start up the application you used to create the document (a word processing application for a letter, a spreadsheet for a budget, and so on), and then instruct the application to get the document from the disk on which you saved it. (The manual that came with the application will tell you how to do this.) At your request, a copy of that document is loaded into the memory of the computer, and a portion of the document (whatever can't) appears on the screen.

If you make changes to the document, and like what you've done, you have to save the revised version of the document on the disk. (If you forget to save it, your original document will still be on the disk, but it won't include any of your additions or changes.)

If you save the revised document without changing the name, the revised document replaces the original document on the disk. Almost all applications warn you that there is already a

document by that name on the disk and ask you to confirm that you want the new document to replace the old one. If you save the revised document with a new name (even if the new name is just the original name with a new version number), both the old version and the new will be on the disk.

If you save several versions of the same document on one disk, there comes a time when you want to erase some of the early efforts so you can reuse the disk space. Read the system disk guide for information on deleting documents from disks.

Printing a Document

Whether you've finished a document or just want to see how it looks so far, there's something very satisfying about printing your document getting a copy of it down on paper. Many people find it easier to edit on paper than on the screen.

Before you print, you should always save a copy of your document on a disk even if you don't plan on saving the document perma-nently. The reason for this precaution is that when you give the Print command, the application temporarily gives up control of the computer system to the printer.

If there's a problem printing the document, the only way to fix it may be to turn off the computer. If you have to do that and you didn't first save the document, you'll have to recreate the document from scratch.

How you tell the application to print your document depends on the application, but usually Print is an option on a menu. After you choose the Print option, you may be asked to select your printer from a list of printers displayed on the screen. If your printer is on the list, select it and your document will be printed.

Even if your printer isn't displayed on the screen, try selecting one that is. Your printer may be compatible with the Apple ImageWriter printer or some other printer on the list, and you'll save yourself some time and trouble getting your printer to work with your application.

If your printer is not on the list or compatible with one of the printers on the list, you'll need to provide the application with some specifications about your printer (things like the baud, number of data bits, number of stop bits, type of parity, and other specifications that may be Greek to you). The reason for providing these specifications is that different printers expect to receive information from the computer at different speeds and in different forms. The specifications tell the application how to send information to your printer. You should be able to'nd the specifications in the manual that came with your printer. If you can't, contact your authorized Apple dealer or the printer manufacturer.

You don't need to know what the specifications mean to find them in the printer manual and feed them into the application.

Some applications don't ask for the name of your printer or for specifications about your printer. They let the computer control how information is sent to the printer. If that's the case with the application you're using, and if it works, don't give it another thought. But if you're having trouble getting your document to print, you may need to change the way the computer is sending information to the printer. You can do this by changing the printer port settings in the Control Panel Program.

Essential Jargon

This section defines some terms and explains some concepts that applications may take for granted that you know.

For example, you might need to know that information isn't stored inside the computer as letters and decimal numbers. It's stored as strings of 0's and 1's. Each letter, number, and punctuation mark on the Apple IIgs keyboard has its own distinct arrangement of 0's and 1's. The letter A, for example, is expressed as 1000001; B is 1000010.

The 0's and 1's are called bits. They're not really 0's and 1's; they're opposite conditions, but it's more convenient to represent them as numbers. Even though it takes only seven bits to represent each character on the keyboard, the computer allocates eight bits for each character. The extra bit is sometimes used for error checking. A string of eight bits is called a byte.

The computer also uses 0's and 1's to do arithmetic. Whereas humans use a decimal numbering system (based on the number of fingers on their hands), computers use a binary numbering system (based on the two symbols they know how to manipulate: off/on or 0/1).

So, the computer processes information as 0's and 1's. It stores these 0's and 1's in RAM, which stands for random-access memory. It's called random-access memory because the microprocessor can go directly to any information it needs it doesn't have to access the information sequentially the way you read a novel. The important thing to remember about RAM is that anything you store there is temporary. When you turn off the power, everything in RAM is erased that's why you have to remember to store documents on disks.

Do not confuse RAM with a similar acronym, ROM. ROM, which stands for read-only memory, is the computer's permanent memory. It's called read-only memory because the micro-processor can read and use what's on ROM chips, but it can't store anything there. ROM chips contain the information that tells the computer what to do when you turn on the power, and other important or indispensable information. That's all you need to know about ROM. RAM is of much more interest to you because that's where the computer keeps track of the application you're working with and the document you're working on. When this manual refers to memory, it's almost always referring to RAM.

Chapter 3 – The Mouse and the Keyboard

Your Apple IIgs came with two important devices: a keyboard and a mouse. The keyboard is for typing documents and for sending typed instructions to applications. The mouse is for drawing pictures and for pointing to choices on the screen another way of sending instructions to applications. The mouse and the keyboard are input devices; that is, they send information into the computer.

How these devices work depends on the application so it' s up to the manual provided with the application to tell you what you need to know to use the mouse and the keyboard with the application. But the application may assume some familiarity with the special keys on the Apple IIgs keyboard and with mouse terms like clicking, cutting, pasting, dragging, selecting, and choosing from pull-down menus. If you have questions that aren't answered in the manual provided with your application, come back to this chapter for clarification.
Applications written before the mouse came along accept only keyboard commands. More recent applications usually give you a choice of using the mouse or the keyboard. These applications are called mouse-based applications.

The first part of this chapter defines mouse terms and describes the standard user interface for mouse-based applications. The second part of this chapter introduces the special keys on the Apple IIgs keyboard and describes the standard user interface for keyboard-based applications.

Some applications don't conform to the standard Apple II user interface described in this chapter. This is especially true of older applications because they were written before a standard existed. If you find yourself faced with an application that does things a little differently, rely on the manual that came with the application for instructions on how to use

it.

Using Mouse-Based Programs

When you move the mouse across your desk, a small arrow, called a pointer, moves in a
corresponding way across the screen.

Clicking

Pressing and releasing the mouse button is called clicking. You point to something and click
when you want to select that item for some action.
Double clicking means pressing and releasing the mouse button twice in rapid succession. It's a
shortcut used in many mouse-based applications. Where the shortcut leads depends on the
application. Again, the manual provided with the application will tell you how double clicking
is used in that application.

Selecting

When you point to a word or picture and click the mouse button, you are selecting that word or
picture for some action.

Selecting is an important concept in mouse-based applications. You select something; then you
tell the application what action to perform on the selected text or picture. For example, you
might select a block of text and then tell the application to delete it or move it somewhere
else in the document.

To select a block of text, point just to the left of the first character, hold down the mouse
button, move the pointer to the right of the last character, then release the mouse button. The
text between the first and last character will be highlighted to show that you selected it.

Holding the mouse button down while you move the mouse is called dragging.

Besides dragging across text to select it, you can use the mouse to drag objects from one place
on the screen to another. You can move a window by dragging it with the title bar or change the
size of the window by dragging the size box. You'll learn more about dragging later in this
chapter.

Pull-Down Menus

Menus in mouse-based applications stay out of sight until you need them. In this respect, they
are like those maps you may have had in elementary school. The teacher pulled down the map to
teach geography, then rolled it up to demonstrate subtraction on the blackboard.

To pull down a menu in a mouse-based application, just point to the title of the menu and hold
down the mouse button. (The menu will remain visible until you release the mouse button.)

Each word or picture on the menu bar represents a different menu. Each application has its own
menus, but there is almost always one called the File menu. The File menu is the menu you'll
use when you want to do something to the document as a whole save it on a disk, quit using it,
and so on.

Choosing

To choose a command from a menu, point to the menu title, hold down the mouse button, move the
pointer down the list until the command you want is highlighted, then release the button.

Choosing a command

Many mouse-based applications let you use a certain key combi-nation (like pressing the Apple key-S) instead of choosing a command from a pull-down menu. Typing key combinations is faster for some experienced users and touch typists, but it's not as intuitive. (You have to remember the key combinations instead of finding the command you want on a menu.) Keyboard equivalents to pull-down menu commands are usually shown on the menu.

Editing

Applications that use text have a blinking symbol that marks the insertion point the place where what you type will be inserted. When you start a document, the insertion point is usually in the upper-left corner of the screen. As you type, the blinking symbol moves to the right. When you reach the right margin, the insertion point moves to the start of the next line. If you are in the middle of a word when you reach the right margin, the whole word moves to the next line automatically. This is called word wraparound.

Insertion Point

To insert a word or sentence in the middle of a document, scroll the document until you come to the place where you want to insert text, move the pointer to the exact place where you want to insert text, click the mouse button, and start typing. Words to the right of your insertion will move over automatically and wrap around to the next line to make room for what you type.

Deleting

To delete a character, a word, or a sentence from the middle of a document, scroll the document until you see the text you want to delete, position the pointer to the right of the text you want to delete, click the mouse button, and press Delete until the unwanted text is deleted.

Deleting Text

To delete longer passages, some applications let you drag across the text to select it and then press Delete once to delete the whole passage.

Cutting and Pasting

To move text from one place to another, move the pointer to the beginning or end of the section you want to move, and drag across the text to select it. Then choose the Cut command from the Edit menu. When you choose Cut, the selected text disappears from the screen.

Though it seems to have been deleted, the text you cut is actually stored on the Clipboard, a special holding area in the memory of the computer. To insert the text you just cut, move the pointer to the place you want to insert it, click the mouse button, and choose Paste from the Edit menu. When you choose Paste, the text reappears at the new location. The Clipboard holds only one clipping at a time. If you cut a second block of text without pasting the first block of text, the first block you cut is lost.

Copying

To copy a block of text, select it, then choose the Copy command from the Edit menu. This puts a copy of the selected text in the Clipboard. Next, move the pointer to the place you want to insert the text, click the mouse button, and choose Paste from the Edit menu.

Windows

With mouse-based applications, you look at your document through a window. With some applications, you can have several windows on the screen. This lets you see more than one document at a time.

The contents of windows vary, but most windows have these things in common: a title bar, a close box, a size box, and a scroll bar. You can use these tools to change what you see through a window, change the size of a window, move a window, close a window, and activate a window.

Parts of a Window

Most of the time, you want the window you're working in to fill the whole screen so you can see as much of the document as possible. But sometimes it's useful to shrink the window so you can see more than one document at a time.

To shrink a window, point to the size box and drag it up and to the left. To expand a window, point to the size box and drag it down and to the right.

To move a window, point anywhere in the title bar (except on the close box), and drag the window wherever you want to put it.

Some applications let you have several windows on the screen at one time, but only one of those windows can be active. A window has to be active before you can make any changes to the informa-tion in it. The active window's title bar is highlighted to distinguish it from nonactive windows on the screen.
To activate a nonactive window, use the size box to shrink the active window until you can see the window you want to activate in the background. Then click anywhere on the nonactive window and it will move into the foreground and become the active window.

If a document is too long to fit in the window, there will be a bar running along the right side of the window. This is the scroll bar. When you drag the scroll box along the scroll bar, different parts of the document come into view. The scroll bar represents the total length of your document. So, if you want to see the middle of your document, drag the scroll box to the middle of the scroll bar. To scroll one line at a time, click the scroll arrow that points in the direction of what you want to see. To scroll a windowful at a time, click within the gray area of the scroll bar above or below the scroll box.

If a document is too wide to fit on the screen, there will also be a scroll bar along the bottom of the window. Drag the scroll box left to see the leftmost side of the document. Drag it right to see the rightmost side of the document.

To close a window, click on the close box in the upper-left corner of the window. This has the same effect as choosing the Close command from the File menu.

Using Keyboard-Based Applications

Keyboard-based applications look totally different from mouse-based applications. For one thing, they generally start with a menu that takes up the whole screen.

Main Menu

The first menu you see is called the main menu. You type the number (or letter) that precedes the option you want and then press Return. Pressing Return confirms your choice. In some applications, you can use Up Arrow or Down Arrow to highlight the menu item you want to select instead of typing a number or letter.

Depending on the application, you then either move to a more specific menu or start doing whatever you chose to do from the main menu. In some applications, secondary menus are

displayed overlapping the main menu, with enough of the main menu showing to remind you where you are in the application.

Overlapping Menus

In most keyboard-based applications, you get back to the main menu by pressing Esc or the Apple key-Esc. Esc stands for escape, and that's what it lets you do. It's sort of the opposite of pressing Return. While pressing Return confirms a choice, pressing Esc usually cancels a choice or extricates you from an activity.

Moving the Cursor

The arrow keys in the lower-right corner of the keyboard move the insertion point up, down, left, or right except that it's not called an insertion point in keyboard-based applications; it's called a cursor. Like the blinking bar in mouse-based applications, the cursor marks the spot where your next action will take place. Sometimes the cursor is a blinking box; sometimes it's a blinking underline.

Early models of the Apple II didn't have Up and Down Arrow keys, so programmers who needed to make the cursor move up and down took matters into their own hands and designated certain keys on the keyboard to accomplish that function. Usually they designated a set of four adjacent keys (that formed a cross) to be the up, down, left, and right cursor-moving keys. You won't have any trouble using such an application on your Apple IIgs as long as you remember to use the substitute keys instead of the arrow keys.

Control Keys

Whereas you control mouse-based applications by choosing commands from pull-down menus, you control keyboard-based applications by using Control or the Apple key in combination with another key. For example, you might hold down the Apple key while you press P to print something, the Apple key and D to delete something, the Apple key and S to save something, the Apple key and C to cut something, and so on.

Because key combinations vary from application to application, the only way to find out how a given application uses Control and the Apple key is to read the manual that came with the application. To make it easier to remember the key combinations, the key you press in combination with the Apple key or Control is usually the first letter of the function it performs.

Typing a Document

Whether you're using mouse-based or keyboard-based applications, you'll use the keyboard to type your documents. In general, the main part of the keyboard works like the keyboard on a type-writer, and the built-in numeric keypad works like the keys on an adding machine; but there are a few things you should know about the keys on the keyboard.

Return

In word processing applications, when you reach the end of a line of text, the insertion point moves to the next line automatically. You use Return only when you want to start a new paragraph. If you press Return instead of letting the application handle line breaks, you interfere with the application's ability to rearrange the words on a line after you make changes.

If you discover that you've pressed Return by accident, you can delete the extra Return character the same way you delete any other character, even though the Return character is invisible! How do you know it's there if it's invisible? You know it's there if your lines

break in funny places after you make changes to a paragraph.

An Errant Return Character

Some applications give you a way of displaying Return characters so you can see if you inserted any where they don't belong.

Incidentally, Return is represented in some applications and manuals not by name but as a bent arrow pointing down and to the left. The icon represents the movement of the cursor when you press the key: it moves down a line and over to the left margin.

Shift and Caps Lock

The Shift keys on the Apple IIgs keyboard work just like the Shift keys on a typewriter. To get a capital letter, you hold down Shift while you type the letter you want capitalized. To get the upper character on two-character keys, you hold down Shift while you type the two-character key. For example, to type a dollar sign, you hold down Shift while you press 4.

If you want everything you type to come out capitalized, you can press down Caps Lock. (You'll feel the key lock in place, and you'll notice that it has a lower profile than surrounding keys.) When you want lowercase characters again, press Caps Lock a second time and the key will return to its upright position. The nice thing about Caps Lock is that it affects only the alphabet keys it doesn't give you the upper character on two-character keys. To get an upper character, you still have to use Shift. Unlike the typewriter, this means you can get all capital letters interspersed with numbers without releasing Caps Lock.

Tab

Tab works like the Tab key on a typewriter, except that instead of the typewriter's print head moving to the right a preset number of spaces when you press Tab, the insertion point moves to the place you designate as the next tab marker. Setting tab markers and using Tab are handy when you're typing information in columns.

You set the tab marker (that is, you set the distance you want the insertion point to move) by using a command in the application. Not all applications use Tab this way, but most word processing applications do.

Keys That Can Be Confusing

Touch typists often use the lowercase letter l for the number 1 (because the l is conveniently located on the home row, and the 1 is a long reach for the left pinky). You can't do that with a computer. The computer translates each keypress into a code of 0's and 1's. The code for the letter l is different from the code for the number 1. If you save a document with the name Chapter1 and try to retrieve it by typing Chapterl (instead of Chapter1), the computer will tell you there is no such document on the disk, and you could have heart failure over your lost document before you realize what you've done.

The same is true with the capital letter O (Oh) and the number 0 (zero). The computer will balk if you try to add a number with the letter O in it.

Space Bar

The Space bar is another key on the computer keyboard that behaves differently than its typewriter counterpart. On a typewriter, a space is an area on the paper where nothing is typed. On a computer, pressing the Space bar inserts a space character. Just as 1 and l are different, so is a space character different from the space that you get when you press Right Arrow. Some applications, aware of the potential confusion, ignore extra space characters.

But in other applications, the word Jones and the word Jones followed by a space are as different as the words Jones and Smith.

Auto-Repeat

When you hold down a key on the Apple IIgs keyboard, it repeats just as it would on an electric typewriter. This feature is called auto-repeat.

If it's physically difficult for you to press and release the keys quickly or if you just have a heavy hand on the keys, you can use the Control Panel Program to change the length of time before a pressed key starts repeating. By the same token, if you have a very light touch and find the keyboard sluggish, you can use the Control Panel Program to make the keys repeat after a shorter interval.

Type-Ahead Keyboard Buffer

After you get familiar with an application, you'll know by heart the questions it asks, and you'll find yourself typing responses before the questions even appear on the screen. For example, you'll remember that after you choose the Print command from the menu, the application will ask you how many copies you want to print. To save time, you can type the answer to the question before it even appears on the screen. The application isn't ready for the answer, so what you type doesn't appear on the screen, but it's stored in a special part of memory called the keyboard buffer. When the application is ready to accept input from you, it retrieves what you typed from the keyboard buffer and carries out your typed instruction.

Numeric Keypad

The number keys on the right side of your keyboard are arranged like the keys on an adding machine. This makes it convenient to enter numbers in spreadsheets and other number-oriented applications. In most applications, the keys on the keypad work exactly like the number keys on the top row of the main keyboard, and you can use them interchangeably. In some applications, they may work as function keys that is, as keys that you press to perform certain functions like printing or saving documents. If they are used as function keys in a given application, the application will tell you what the functions of the various keys are.

Chapter 4: Saving Documents

After you finish creating a document; actually, as soon as you create anything worth keeping; you should save it on a disk. Otherwise, it will be lost forever when you turn off the computer's power switch (or accidentally kick the computer's power cord out of the outlet). It doesn't matter whether you save the document on a 3.5-inch disk, a 5.25-inch disk, or a hard disk. Saving is the same regardless of the kind of disk you're saving on. What varies is the procedure for saving, and that can vary from application to application.

Read the manual that came with your application for instructions on how to save documents created with that application. If the instructions are clear, you may not need to read this chapter.

With most applications, saving a document on a disk is a very easy, intuitive procedure. You select the Save command from a menu, and the application asks you a few straightforward questions about where you want to save the document and what you want to name it. Actually, the questions are only straightforward once you know what the application means by such terms as pathname, prefix, volume name, filename, format, directory, and subdirectory.

This chapter explains these terms and other things you may need to know about saving documents

on disks.

Formatting a Disk

Before you can save documents on a blank disk, the disk has to be formatted. Formatting divides
a disk into sections where information can be stored.
Different applications go to different lengths to help you get disks formatted:

Some applications offer to format a disk automatically when they discover that you've asked
them to save a document on a blank, unformatted disk.

Some applications offer formatting as one of the commands on the application program's menu.

Some applications, discovering an unformatted disk, just beep and put a message on the screen
to the effect that you'd better exchange the blank disk for a formatted one if you expect to
save anything on it. In this case, you should format using the System Disk. (The procedure for
formatting is explained in the system disk documentation.)

Important   Find out how your application handles formatting before you create a lengthy or
important document. If your application is the type that doesn't format disks and you don't
have a formatted disk handy, you'll have to quit the application and lose the document in
memory in order to format a disk.

When a disk is formatted, three things happen:

You're asked to give the disk a name (often referred to as the volume name for reasons
explained a little later).

The disk is divided into sections where information can be stored;parking space for your data.

A directory is set up on the disk. At first, the directory is empty except for the name of the
disk and the amount of space avail-able on the disk; but as you save documents on the disk, the
names, sizes, and locations of those documents are recorded in the directory. Applications use
the directory to find the loca-tions of the documents you ask them to load into memory. You can
use the directory to see what's on a given disk.

Important   Formatting erases everything stored on a disk. You should format a disk only before
you save something on it for the first time or when you want to erase everything that's on the
disk.

Why disks are sometimes called volumes: Volume is a general term for an area where information
is stored. It's less media-specific than the word disk. If you're storing information on a
5.25-inch disk or a 3.5-inch disk, disk name and volume name are synonymous. With
large-capacity storage devices like hard disks, you can have more than one volume on a disk.
That's why some applications ask for volume name instead of disk name.

Saving a Document

When you want to save a document on a disk, you choose the Save command from the application's
menu. After you choose the Save command, the application usually asks you where you want to
save the document. There are lots of ways the application might ask this question; one way is
to give you a list of choices like this:

Save To:
3.5-inch Drive #1
3.5-inch Drive #2
PATHNAME:

Saving to a disk in a certain disk drive

If you choose 3.5-inch Drive #1 or 3.5-inch Drive #2 (or any disk drive shown on the screen), the next question is: What do you want to name the document? You type a name and press Return, the document is saved on the disk you specified, and the name you gave the document is recorded in the disk's main directory along with its location on the disk.

Naming a Document

You can name your document anything you like, provided there isn't already a document by that name on the disk and provided the name conforms to the application's rules for naming documents. (You should be able to find the rules for naming documents in the manual that came with the application.) Some applications won't allow spaces in document names. Some applications won't let you start a document name with a number or a punctuation mark. Most applications limit the length of the document name to 15 characters. If you want to play it safe, follow these guidelines in naming your documents:

Start the name with a letter.

Don't Use Spaces.

If you don't want to play it safe, give your document any name you like and see if the application lets you get away with it. The worst that can happen is that you'll get a beep and an error message like ILLEGAL FILENAME and you'll know that the name you typed was too long, started with the wrong kind of character, or included spaces when the application didn't allow it. Then you'll get a chance to type another name.

Saving with a Pathname

The Pathname option is for people who organize their disks into subdirectories. Organizing a disk into subdirectories is like putting documents into file folders instead of throwing them randomly in a drawer.

For example, you might have a drawer in your office where you file personnel information on your employees. In that drawer you have folders called Finance, Sales, Manufacturing, and so on. Inside each folder are documents with personnel information on each employee in that department. You can use this same system to organize information on a disk. You would name the disk PERSONNEL; set up subdirectories on the disk called FINANCE, SALES, and MANUFACTURING; and save documents with personnel information on each employee in the appropriate subdirectory.

Organizing documents into subdirectories not only makes it easier for you to find documents on a disk, but also makes it faster for the computer to locate and load documents you want to revise.

When you look at the directory of a disk, you don't see the name of every document in every subdirectory. You see only the sub-directory names and the names of documents you saved directly onto the disk rather than into subdirectories. (Looking at a disk directory and seeing only subdirectory names is like opening the drawer of a file cabinet and seeing the names on the folders rather than seeing every document in every folder.) If you want to see the names of the documents in a subdirectory, type the disk name, a slash, then the subdirectory name when you ask the application for a directory listing.

Creating Subdirectories

Before you can save documents in subdirectories, you have to create the subdirectories. Some applications give you a way to create subdirectories from within the application; others expect

you to create them with the System Disk.
Once you've created your subdirectories, you can save documents in one of those subdirectories
by typing a pathname. A pathname is the complete name of the document, starting with the disk
name (also called volume name), then the subdirectory name, then the document name. The
pathname starts with a slash, and each part of the pathname is separated from the next part
with a slash.

The pathname /PERSONNEL/SALES/JONES tells the application to save the document on the disk
called /PERSONNEL in the subdirectory called /SALES and to name it JONES. If you don't use
subdirectories, the pathname is simply the disk name and the document name;for example,
/PERSONNEL/JONES.

As the word suggests, a pathname describes the path or route to a document.

Setting a Prefix

A pathname is a very descriptive way of telling an application the route to a document, but
/PERSONNEL/SALES/JONES requires a lot of typing. Fortunately, there's a shortcut. You can set a
prefix. A prefix is the first part of a pathname.

It can be just the disk name (/PERSONNEL) or it can be the disk name and the subdirectory name
(/PERSONNEL/SALES). Once you've set the prefix, you don't have to type the whole pathname. You
just type the document name (for example, JONES), and the application tacks the disk name and
subdirectory onto the front of what you type.

Setting a prefix allows you to work with different documents in the same subdirectory more
conveniently. You can save or load any document in that subdirectory by typing just the
document name, not the whole pathname. When you want to work with a document in a different
subdirectory, you can either change the prefix or over-ride the current prefix by typing the
complete pathname of the document.

The application you're using will tell you how to set a prefix.

Other Ways to Save

If an application asks for a slot number and a drive number when you choose the Save command,
it's asking which slot contains the disk drive controller card for the drive you want to save
to, and whether that drive is attached to the drive 1 connector or the drive 2 connector on the
controller card. (A disk drive controller card can control up to two disk drives.) If your disk
drive is connected to your computer through a disk drive controller card, the answer is
straightforward. (Even if you can't remember which slot your controller card is in and which
drive is attached to the drive 1 connector on the card, you can always remove the cover from
your Apple IIgs and have a look.)

But what if your disk drive is connected to the computer through the disk drive port and not to
a slot? In this case, you supply the slot number that corresponds to the disk drive port. For
3.5-inch drives, the corresponding slot is 5. For 5.25-inch drives, the corresponding slot is
6. (The disk drive port was designed to emulate a slot with a disk drive controller card so
you'd be able to use software that looks for a controller card in a slot.)

If you have more than one drive of the same type connected to the disk drive port, drive 1 is
the drive connected directly to the computer. Drive 2 is the drive connected to drive 1.

Other applications may expect you to indicate where you want your document saved by typing the
document name followed by a comma, followed by the letter D (short for drive) and a drive
number. For example, typing MEMO,D2 or.D2/MEMO tells the operating system to save the document
named MEMO on the disk in drive 2. If you don't type a D and a drive number, the application

assumes you want to save it on the disk in the drive you last accessed.

Disk Operating Systems

When you tell your application to save a document on a disk, it hands the job over to a
subcontractor called the disk operating system.

The disk operating system is a set of programs on every application program disk that handles
the transportation of documents between the memory of the computer and disks.

The only reason you need to be aware of the disk operating system is that there are three
varieties;ProDOS, Pascal, and DOS 3.3;and each variety requires that disks be formatted in a
particular way. If your application uses ProDOS (that is, if the application is ProDOS-based),
documents created with that application can be stored only on ProDOS-formatted disks. If your
application program is Pascal-based, documents created with that application can be stored only
on Pascal-formatted disks.

If formatting is handled by the application, you don't need to know what that application's
disk operating system is;the application knows and will format disks the way it needs them to
be formatted.

If formatting isn't handled by your application, you'll use the System Disk and you'll be asked
whether you want the disk formatted for ProDOS or Pascal.
How do you know what operating system your application uses so you know how to answer the
question? You can usually find out by looking at the label of the application program disk or
by using the Catalog a Disk command on the System Disk.

If there is no operating system shown on the label, see if the application's operating system
is mentioned in the application program's manual. (It will most likely be mentioned in the
chapter that discusses how to save documents on disks.)

If you want to know why there are three disk operating systems for the Apple II, and more about
them, read on.

Apple II Disk Operating Systems

In the beginning, there were only 5.25-inch disks and one system for saving information on
them. The system was called DOS, an acronym for Disk Operating System. (Over the years, DOS was
improved, and version numbers were tacked on to distinguish one version from the next. The last
and best version was DOS 3.3.)

The first applications written for the Apple II were written either in assembly language (a
programming language only slightly removed from the language of 0's and 1's that the Apple II
speaks fluently) or in BASIC (a programming language that uses English-like words to tell the
computer what to do). Both assembly-language programs and BASIC programs used the DOS 3.3
system for formatting disks and for saving and retrieving documents, so users didn't have to
know what kind of program they were using.

Then a version of the Pascal programming language was adapted for the Apple II. This was a big
breakthrough because Pascal is a powerful programming language, and the fact that it was
available led to the development of lots of sophisticated applications for the Apple II. The
only drawback to this breakthrough was that Pascal applications didn't use DOS 3.3. Pascal
applications used their own operating system. (Now there's a version of the Pascal program-ming
language that uses the ProDOS operating system, but the first version of Pascal for the Apple
II required its own operating system.)

With Pascal on the scene, users had to keep track of whether the disks holding their documents

were formatted for DOS 3.3 or for Pascal. If they tried to save a Pascal document on a DOS 3.3 disk, they got an error message, and vice versa.

Then came larger-capacity disks;3.5-inch disks and hard disks;capable of holding hundreds of documents instead of the dozens you could store on a 5.25-inch disk. The Pascal operating system was equipped to handle the larger storage devices, but DOS 3.3 couldn't.

So DOS 3.3 was supplanted with a disk operating system that could take advantage of all that extra storage space.

The DOS 3.3 replacement was ProDOS, an acronym for Professional Disk Operating System. The most important feature of ProDOS, besides its ability to use all that extra storage space, is that it supports subdirectories. (It's the only one of the three Apple II disk operating systems that does; so if an application refers to subdirectories or pathnames, you know it's a ProDOS-based application program.)

You may see references to ProDOS 1.1, 1.2, 1.3, ProDOS 8, and ProDOS 16. ProDOS 1.1-1.3 are version numbers. ProDOS 8 refers to versions of ProDOS that are compatible with Apple IIs using 8-bit microprocessors: the IIe, IIc, and the IIgs in 6502-emulation mode. ProDOS 16 refers to versions of ProDOS that are designed for the 16-bit microprocessor in the Apple IIgs. Applications designed especially for the Apple IIgs will useProDOS 16. Applications designed for earlier models of the Apple II or for all models of the Apple II family won't.

You can still run DOS 3.3-based applications on the Apple IIgs, but you can't save the documents on 3.5-inch disks. DOS 3.3 was designed for 5.25-inch disks with a storage capacity of 143K; 3.5-inch disks have a storage capacity of 800K.

Chapter 5: Application Programs

You don't need a lot of equipment to start using your AppleIIgs. You can go a long way with just a monitor, a disk drive, a printer, and a single application. But when you're ready to go further, there are hundreds of ways to go, and lots of tools to help you get there.

The next two chapters introduce some of the applications and peripheral devices you can get for the Apple IIgs. Decide on the types of applications and peripheral devices you need; then choose the specific product based on the recommendations of friends, reviews in computer magazines, reviews in software catalogs, and the advice of your authorized Apple dealer. (Friends are best because if you take their recommendations, they can answer questions that come up as you're learning to use the application or peripheral device.)

You can get a couple of general-purpose applications like a data base application and a spreadsheet application and adapt them for dozens of different purposes. Or you can get very specialized applications: a data base that's already set up as a running log, a recipe file, a coin collector's journal; a spreadsheet already set up for preparing a home budget, preparing your income taxes, balancing your checkbook, or for analyzing different mortgage options.
The advantage of general-purpose applications is their flexibility. You can use one application for dozens of different things, and you can decide how to set up the form you use for filling in your information. The advantage of specialized applications is that they're easy to use. All you do is fill in the blanks.

The following sections describe some general-purpose appli-cations, followed by a list of some of the specialty applications available for the AppleII family of computers. You can find out about other specialty applications by looking through computer magazines or software catalogs.

Choosing An Application

Here are some things to think about when you're evaluating an application:

Is it easy to use? If it uses a standard interface (that is, if it follows the conventions described in Chapter3), it will be easier to learn than an application with an unconventional user interface. A good manual is another thing that makes an application easier to learn. As important as it is, don't make simplicity your only criterion. Sometimes an application is easy to learn because it doesn't do much. If you find a simple application, make sure it also has the features you want.

Does it take advantage of Apple IIgs features, or is it designed to run on all models of the Apple II family? Applications designed especially for the Apple IIgs can take advantage of super-high-resolution graphics and other Apple IIgs-specific features. If that's important to you, look for new applications or applications that have been revised to take advantage of Apple IIgs features.

If, on the other hand, it's important that the applications work on other models of the Apple II, make sure the application is advertised as Apple IIe-compatible, Apple IIc-compatible, or Apple II Plus-compatible.

Is it compatible with other applications you have? Can you insert a list created with your data base into a letter written with your word processing application? Applications designed to work together and share information are called integrated software.

Does it work automatically with your printer? The key word here is automatically. Hackers can make all sorts of different devices talk to each other, but if troubleshooting isn't your idea of a good time, look for software that's already configured for your printer.

Does it do exactly what you want it to do? Sometimes it's worth sacrificing ease of use and the standard user interface to get an application that does exactly what you need to do.

If the application is complicated, are there classes you can take to learn how to use it?

Is there a hot line you can call for answers to your questions?

How much does it cost? Cost is a factor in choosing applications, but it's the last thing on this list because you won't save money by getting a cheap application that takes four months to learn or has bugs that destroy a document it took you three hours to type.

Word Processing

Word processing applications are for writing thingsfrom short things like memos to long things like books. They don't do the writing for you, or even the typing they just make it very, very easy to add, move, delete, and change your text and correct mistakes.

Besides improving your writing by making it easy to rewrite, a word processing application can improve the way your writing looks. Using the formatting features of your word processing application, you can change the width of margins, underline and center headings, put words in bold for special emphasis, and much more.

Not all editing and formatting features are available in every word processing application. Think about what's important to you, and make sure the application you get meets your needs.

Here are some of the things you can do with word processing applications:

Insert characters, words, and paragraphs (and the application rearranges surrounding text to make room for your additions).

Wrap words automatically. (When the insertion point reaches the end of the line, it and any

word that won't fit on the current line go to the start of the next line automatically; you
don't have to press Return.)

Delete characters or whole sentences with a few keystrokes.

Replace one word or phrase with another. (Type the old word, type the new word, and the
application will replace the old with the new throughout the document; this is called search
and replace.)

Move text from one part of the document to another (also called cut and paste).
Copy text from one document to another or to another part of the same document.
Set margins and tabs.
Choose from a variety of type sizes and type styles.
Put text in footnotes.
Indent lists.
Single, double, or triple space.
Number pages automatically.
Insert running headers and footers (text that is printed at the top and bottom of each page).
Left-justify, center, or right-justify your text.
Companionapplications

Here are applications designed to work with some word processing applications:

Spelling checker: an application that reads through your document and finds any words that
aren't in its dictionary.

Form-letter maker: an application that inserts names and addresses from a data base into
documents created with your word processing application (also known as a mail-merge
application).

Database

Data base applications are for keeping track of information about people, places, and things.
You don't have to be the owner of an auto-parts store to use a data base. You could be a
fisherman keeping a record of the location, time of day, weather, and lure used to catch each
trophy fish. You could be a home owner keeping a record of your valuables for insurance
purposes. You could be a head hunter keeping a record of clients, their current jobs, and their
job skills.

The information about each person, place, or thing is called a record. If you have a data base
that lists the names, addresses, and phone numbers of all your clients, and you have 42
clients, there are 42 records in your client data base. Each category of information you keep
track of is called a field. If your address-book data base includes the name, address, phone
number, and birthday of each friend, you have four fields in that data base.

Records and Fields

The tedious part of using a data base application is typing all the information when you set up
a new data base. The fun part is using the application to search for a particular piece of
information or to rearrange the information according to criteria you specify.

Sometimes it's useful to know every detail about everything in your data base, but most of the
time you want a subset of the informationall your clients with birthdays in December, a list of
students who scored more than 650 on their SATs, a list of customers who spent more than $2000
on shoes last year and you don't care about the other information that's in the data base.
These subsets are called reports. You can generate hundreds of different reports from one data
base without affecting the information in the data base as a whole.

Application Programs

Different data base applications have different limits on things like the number of records you can keep, the number of fields, and the length of each field. Figure out what you want to do with the data base application and make sure the application lets you do it. Here are some things you can do with data base applications:

Sort records alphabetically (A to Z or Z to A).

Sort records numerically (high to low or low to high).

Perform calculations on numerical fields (so you can figure out, for example, your area's total sales or your class's average score on the last test).

Check errors automatically. (If one of the fields is social security number, for example, some applications can check to be sure you've entered a nine-digit number.)

If the information you want to keep track of doesn't fall into neat categories, you can get a free-form data base. With a free-form data base, you enter data in paragraph form and designate certain words as key words that you can search for later.

Spreadsheet

Spreadsheet applications are for working with numbers most often with numbers attached to dollar signs. The traditional spreadsheet application starts you off with a blank screen laid out in rows and columns like a ledger. The rows in a spreadsheet are numbered; the columns are lettered. The intersection of a row and a column is called a cell. You describe different locations on the spreadsheet the way you describe locations on a map for example, A1 is the intersection of column A and row 1; B12 is the intersection of column B and row 12, and so on.

With a paper ledger, you fill in your assets and liabilities in pencil, and then you add, subtract, and otherwise manipulate the numbers to arrive at a total the bottom line. If any of the numbers change, or if you want to change one of the numbers to see how a different pricing strategy would affect the bottom line, you have to recalcu-late all the numbers by hand.

With an electronic spreadsheet, you still have to fill in the assets and liabilities, but you can write formulas that define the relationships between the various cells. Instead of just adding up the numbers in cells C5, C6, and C7, and putting that total in C9, you define cell C9 as the sum of C5 + C6 + C7. Once you've defined the relationships between your numbers in this way, you can change a few numbers (to try out a potential investment or a change in salary) and the application will recalculate all the related values for you.

In the hands of a numbers person, accustomed to formulas for figuring out depreciation, amortization, and such, a spreadsheet is a formidable tool. For the average person, it's just formidable. So, for the average person, intimidated at the thought of setting up formulas on a blank spreadsheet, there are templates prefab spreadsheets that come with the formulas already filled in for things like comparing real estate investments, preparing a home budget, and comparing loan options.

Here are some things you can do with some spreadsheet applications:

Use built-in functions to calculate the average, sum, count (number of items), maximum value, or minimum value in a column or row of numbers and the absolute, integer, and rounded-off value of a number, logarithm, square root, and more.

Adjust column widths.

Cut, copy, and paste numbers and formulas from one cell to another.

Change number format (for example, dollars to scientific notation).

Hide a column (to protect confidential information like salary or age of employees).

Display the spreadsheet in a graph.

Define macros so you can type one command that represents many steps in a routine procedure. Macros are a shortcut for experienced users and an aid to inexperienced users. An experienced user can define the macro and a less-experienced user can enter data without knowing a whole lot about how the application works.

If most of your number crunching involves home finances, you might be better off getting an application especially designed for that purpose.

Communications

With communications software and a modem, you can exchange information with other computers and with computerized information services over telephone lines. Communications software puts the resources of a well-stocked library and post office on your desktop.

With communications software and a modem, you can:

Subscribe to a commercial information service and get the latest stock quotes and news.

Send E-mail (electronic mail) to friends and business associates directly or through an information service.

Post and read notices on computerized bulletin boards (anything from software reviews to resumes).

Download copies of uncopyrighted software from bulletin boards.

Access your business computer from home.

Order clothes and other things through electronic shopping catalogs (a service sometimes described as E-mall).

Bank from home (if your bank offers electronic banking).

The obvious advantages of telecommunicating are speed and convenience. You can send and receive mail in minutes instead of relying on the mail service. You can get news stories and stock quotes before they're published, and you can go straight to the news that interests you instead of wading through all the other news in a newspaper or TV program. You can research court cases and topics for books, articles, or homework assignments without going to a library.

A less obvious advantage of exchanging information over phone lines is that it circumvents the incompatibility that otherwise exists between different brands of computers. You can't take an IBM disk, put it in an Apple II disk drive, load the document into the Apple II, and work with that document. But you can send a document from an IBM computer to an Apple II computer over phone lines and save it on an Apple II disk.

Before you establish contact with a particular computer or information service for the first time, you need to tell your communications application how to talk to that other computer. You do this by giving your communications application certain information about that computer

(information like baud, number of data bits, number of stop bits, type of parity, and so on).

You don't need to know what the specifications mean, but you do need to find out what they are for the other computer (also called the remote computer). If the other computer is an information service, it's easy. The information is spelled out in the documentation that comes when you subscribe to the service. If it's another personal computer, how you send the information depends on the configuration of the other computer's modem port or modem interface card.

Information Services

There are two kinds of information services: general-purpose services, like the Dow Jones News/Retrieval Service; The Sourcesm, CompuServe ; Dialog; and GEnie; and specialized services for lawyers, journalists, stock brokers, doctors, and others.

General-purpose information services let you check the latest news, sports, weather, and movie reviews; exchange messages and mail with other subscribers; make airline reservations; and download (have the service send you) uncopyrighted software.

Services like Dialog give you access to vast libraries of books and articles. You pick the data base you want to access, type a few keywords, and the service searches for all the articles that contain your keywords. It's a fast, efficient way to do research.

If you're interested in one of these information services, ask your authorized Apple dealer how you can get a subscription. Your dealer can tell you how to get your user ID, your password, and the local phone number of the service that interests you.

Bulletin Boards

A computerized bulletin board system (BBS) is a personal computer equipped with a modem, a few disk drives, and special communications software. It is usually a clearinghouse for information, gossip, and uncopyrighted software. Anyone who knows the phone number can call the bulletin board, leave messages, read messages, and download software.

Bulletin boards came into being in 1978 as a way for members of local users groups to exchange messages with each other and share programs by phone. Today there are hundreds of computerized bulletin boards in the United States, and you don't have to belong to a users group to use one. All you need is a computer, a modem, communications software, and the phone number of your local bulletin board system. You can get that from your authorized Apple dealer (in some cases, he'll be a SYSOP, the system operator of a bulletin board), from a users group, or from one of the BBS articles that frequently appear in computer magazines.

Bulletin boards are popular for three reasons:

They're usually free. You don't have to subscribe or pay for connect time the way you do with an information service.

They're a source of free software.

They're a good way to meet people.

The communications application is your gateway to information services, bulletin boards, and other personal computers. It simplifies the procedure for logging on to information services (by letting you store on the application disk the phone number and other critical information about how to communicate with the other computer) and makes it possible to prepare messages in advance (which saves you money) and to save and print information you receive over the phone lines.

Graphics

There are all sorts of graphics applications: business graphics for converting numbers into graphs; clip art applications for making personalized greeting cards and the like; art applications for creating original drawings; and more.

For Business

Business graphics applications take numbers from spreadsheet applications (or numbers you type at the keyboard) and turn them into graphs and charts. (Obviously, it's a lot more convenient if your graphics application works with your spreadsheet application.)

You can use the charts and graphs you create to illustrate reports and presentations or just to clarify statistics in your own mind. If you're going to be using your graphs for presentations, it's handy if your graphics application has a slide-show option, which lets you arrange several graphics in order and changes slides for you after a prearranged number of seconds or with a keystroke. For a large audience, you'll probably want to print your graphs onto sheets of acetate for use with an overhead projector.

For Fun

If you like to make your own greeting cards or garage-sale posters, or illustrate your correspondence, but don't think you have an artistic bone in your body, clip art is for you. Clip art applications come with a library of illustrations: animals, musical instruments, sports equipment, seasonal symbols (a turkey, a firecracker), and so on. You combine the pictures with a personalized message printed in your choice of type style to create greeting cards, stationery letter-head, banners, posters, flyers, birth or wedding announcements, party invitations, or anything else that lends itself to illustration.

For Art

Art applications are for drawing free-hand pictures, designing floor plans, making maps, or just plain doodling.

The nice thing about electronic drawing is that you can edit your work. You can correct mistakes, try out an idea and undo it if it doesn't work, enlarge a portion of your drawing for detail work, and fill in background colors and textures with just a keystroke. And when you finish painting; for the day, you don't have to clean your brushes!

Children can use many of the simpler drawing and clip art applications, but very young children might have more fun with coloring-book applications, in which the kids color pictures by using electronic crayons.

Education

Educational software is for learning and there are lots of ways to learn, aimed at lots of different age groups. There are interactive nursery rhymes, in which preschoolers try to keep Humpty Dumpty from falling off his wall; applications that teach teenagers how to dissect frogs by using electronic scissors in a simulated science lab; applications that coach business people on negotiating strategies; and lots more.

At one extreme on the creativity scale are the drill-and-practice applications. They present information (on spelling, math, music, history, geography, Spanish, French, SAT questions you name it) and then test how well you learned it.

Drill-and-practice applications for kids are often disguised as arcade games, in which the

object is to answer a question before the meteor containing the question crashes into their
spaceship, for example.

At the other extreme are simulations and construction sets. Simulation applications give you
the chance to run a nuclear power plant, study an erupting volcano, see what happens when you
mix explosive chemicals, mingle with dinosaurs, and have all sorts of other learning
experiences that would be impractical, impossible, dangerous, or too expensive in real life.
Construction sets let you design and build a game, a machine, a song, a space station, or a
movie out of tools provided by the application.

When computers first made their appearance in schools, they were used almost exclusively for
drill and practice. As more computers are becoming available in the classroom, the trend is
toward using the computer as a toolfor writing, calculating, and for keeping records and
statistics (the way it's used in a business office). Instead of just using applications that
teach grammar or spelling, English students are also using word processing applications to
improve their writing. Instead of just using applications that teach algebra, calculus, or
quadratic equations, math students are also learning to use formulas and functions in
spreadsheet applications. Instead of just using applications that drill them on historical
dates and the symbols on the periodic table, students in history and science classes are also
learning to access information services and create their own data bases to help them research
term papers.

Teachers who want to try their hand at programming can use a programming language designed
especially for educators called PILOT (an acronym for Programmed Inquiry, Learning, Or
Teaching). PILOT lets you design your own courseware, or CAI (computer-aided instruction)
software. Apple's version of the PILOT programming language is called SuperPILOT.

Adult Education

Educational applications for adults fall into two categories: serious and not-so-serious. On
the serious side are applications that promise to improve your negotiating, sales, management,
or communication skills. On the not-so serious side are applications to help you improve your
gardening, photography, and other leisure skills. More on these later in this chapter.

Learning By Programming

One of the most educational things you can do with a computer is write programs for it.
Programming teaches you to be a logical thinker (because that's the only way to communicate
with a computer) and a persistent troubleshooter (because mistakes are an inevitable by-product
of writing programs). Developing these skills is useful whether or not you make programming a
lifetime career or hobby.

There are several different programming languages for the Apple IIgs. The most popular for
beginning programmers are BASIC, Logo, and Pascal. Vocabulary and syntax vary from one language
to another, but programming principles stay the same. Once you learn one language, it's
relatively easy to learn others. Here's a short description of BASIC, Logo, and Pascal.

BASIC: An acronym for Beginners All-purpose Symbolic Instruction Code. This language is easy to
learn because it allows you to write instructions for the computer in English-like words and
phrases. A version called Applesoft BASIC is built into your computer, so there are no special
disks to buy. Because BASIC was the first language built into personal computers, you'll find
hundreds of books on the subject and many people who speak the same language.

Logo: This is a good first programming language because you can learn the fundamentals of
programming by creating graphics. You start by learning to move a turtle (a cursor shaped like
a triangle) around the screen. The turtle knows a few words like FORWARD, BACK, LEFT, and
RIGHT. You tell the turtle how many steps to go and how many degrees to turn. As the turtle

moves, it leaves a trail on the screen. Ideally, you aren't just taught how many steps to take or how many degrees to turn to draw a square, a circle, or a triangle. The motivation for learning how many degrees make a right angle, a circle, and so on comes from your desire to draw a house, a ball, or a tree.

Pascal: The biggest incentive for students to learn Pascal is that it is the language used by the Educational Testing Service for the college advanced-placement test in computer science. Besides that practical consideration, learning Pascal teaches you good programming habits. It's a structured language, which means that you have to plan your program before you start writing it, and you build your program out of smaller subprograms. Programs with a structure are easier to debug and easier for other programmers to understand than the convoluted programs that can result from languages that let you design as you go along.

If you'd like first-hand experience with programming, go through A Touch of Applesoft BASIC. This book starts from square one. But by the time you finish, you'll know enough to write a simple program for balancing your checkbook, and you'll know whether programming is something you want to pursue further.

Home Finance

Home finance applications help you make decisions about personal investments. You can use a home finance application to:

Prepare a home budget (then compare your actual income and expenses to the income and expenses you projected).

Flag deductible expenses to simplify the preparation of your tax return.

Determine net worth (the current value of your assets minus your liabilities).

Keep track of the appreciation and depreciation of your property.

Find out when you have enough cash on hand to pay bills or make investments.

Evaluate different investment options.

Evaluate loan options. (Can you afford to pay off your home in 15 years or do you need a 30-year loan?)

The only hard part of using a home finance application is finding all your financial papersloan forms, mortgage papers, bank books, check registers, last year's tax return, salary records, free-lance income records, certificates of deposit, stock certificates, phone bills, utility bills, credit card bills, and anything else that affects your finances.

Don't shy away from a home finance application because words like amortization and depreciation are foreign to you. Most home finance applications assume ignorance of financial jargon and teach what you need to know as you go along. Even if you have an accountant do your taxes, and a stock broker or financial adviser plan your investments, a home finance application gives you more control over your finances by keeping you better informed and organized.

In addition to general-purpose home finance applications, there are very specialized applications for balancing your checkbook, managing your stock portfolio, managing your real estate, preparing your income taxes, and more.

Accounting

Accounting software does the same things a manual accounting system can do (general ledger,

accounts receivable, accounts payable, payroll, inventory), but with much greater speed, accuracy, and control. The increased speed and accuracy allow you to get up-to-date reports about your financial position as you need them, instead of waiting for monthly or quarterly reports from your accountant.

A good accounting application can help you improve your cash-flow management, boost your collection rate of receivables, plan payments to take advantage of vendor discounts, maintain inventory levels that minimize cash investment, and improve customer service.

Most accounting software packages are designed around a general ledger. The other modules (accounts receivable, for example) share information with the general ledger to allow automated posting. This modular approach allows smaller businesses to start with a general-ledger package and add additional modules as they are needed.

If you have modest accounting needs, you should investigate home finance applications. Some of them are sophisticated enough for small-business accounting, and they're usually easier to learn and use than full-blown accounting packages.

Recreation

OK, games. There are several kinds of computer games, including shoot-'em-ups, eat-'em-ups, adventure games, simulations, board games, sports games, and some that are harder to classify. You may find that computer games improve your concentration and reflexes, teach you to be a more persistent problem-solver, help you relax after a hard day at the office, distract you during a hard day at the office but it's OK if all they do is entertain you.

Shoot-'em-ups are modeled after the video games in arcades. They test your hand-eye coordination and your reflexes against invading aliens, enemy missiles, and falling meteors.

Eat-'em-ups, also called maze games, are modeled after Pacman. The object of an eat-'em-up is to eat your adversaries before they can eat you.

Adventure games also called fantasy games, role-playing games, or interactive fiction transport you to a fantasy land where you try to accumulate the right combination of weapons, tools, keys, and companions to conquer whatever monsters stand between you and the treasure. You communicate with the application by using one-word or two-word commands like GO WEST or OPEN DOOR. Unlike shoot-'em-ups and eat-'em-ups, adventure games don't require fast reflexes. These games can last for hours or even days. Fortunately, there's usually a way to save your game-in-progress so you can take a break and pick up where you left off.

Simulations are like adventure games except that you are transported to the simulation of a real-life situation: a nuclear power plant, the Lewis and Clark expedition, or a 1944 naval battlewhere you try to solve real-life problems. (These games come dangerously close to being educational.) Besides games that simulate situations, there are applications that simulate an activity, like flying a plane or driving a race car.

Board games are electronic versions of chess, checkers, and other popular games. There are also electronic card games, including gin rummy, bridge, poker, and blackjack.

Sports games for armchair athletes include electronic versions of football, baseball, basketball, soccer, golf, tennis, the decathlon, billiards, darts, and almost any other sport you can think of.

Music

Music applications range from elementary educational applications that teach you how to read music, to applications for serious composers.

By adding a Musical Instrument Digital Interface (MIDI) card to your computer system and by using applications designed for the purpose, the Apple IIgs can control electronic keyboards and drum machines or function as a music synthesizer. As a music synthesizer, the Apple IIgs can generate the sounds of drums, guitars, flutes, horns, and all sorts of other musical instruments. This lets you compose for a band or an orchestra and hear how each part will sound.

Special Interest

Special-interest applications, also called vertical-market software, are applications that cater to a particular audience or profession. They're more expensive than general-purpose software, but much cheaper than hiring a programmer to write software from scratch.

Lawyers can find applications that handle billing, help with research, and keep track of court appearances and filing dates. Medical offices can get data base applications customized to deal with patient histories, help diagnose illnesses, and match allergy symptoms to causes. Other medical software handles billing and appointments, and helps process insurance claims. Teachers can find applications that keep track of attendance, record test scores, and help prepare tests.

Farmers can get applications dedicated to herd management and crop rotation, as well as more general record-keeping software.

You can find applications for manufacturing control, for scientific measurement and analysis, and for virtually any area where a specialized need for calculating or sorting exists. Vertical-market software isn't always listed in software catalogs, but you can find out what's available by reading the software ads in professional journals and by attending computer seminars sponsored by your professional organization. The American Bar Association, for example, has a Committee for Computers that sponsors user groups for lawyers and promotes conferences and seminars on the use of computers in the legal profession.

Free Software

Software that hasn't been copyrighted is called public-domain software. It's free. It's legal. And you can get it for the asking from your local users group or by downloading it from a computer bulletin board. The only cost to you is the cost of the disk you copy it onto.

But beware! The money you save may be insignificant compared to the time it takes you to learn a program that doesn't come with a manual. Also, free programs aren't always debugged as thoroughly as published applications and may not have such niceties as menus, user-friendly prompts, or help screens.

More Applications

In addition to general-purpose applications like data base, spreadsheet, and word processing applications, you can get very, very specialized applications. Here's a sampler of subjects for which there are applications. You can find out more about these and other specialty applications by looking through computer magazines or a computer catalog.

Education

English

vocabulary
sentence diagramming
synonyms and antonyms

capitalization
vowels and consonants
phonics
reading skills
verbs
spelling
nouns
commas
pronouns
analogies
adjectives
phrases adverbs
clauses
conjunctions
sentences

Foreign Languages

Spanish
Latin
Russian
Hebrew
French
Italian
German

Social Studies

U.S. history
U.S. geography
world history

Chemistry

titration
alkanes and alkenes
gases
infrared spectroscopy
calorimetry
atomic structure
thermodynamics
periodic table
organic
chemistry

Physics

mechanics
quantum theory
velocity
thermodynamics
wave theory
projectiles
particle
scattering
vectors
sine waves

energy

Biology

plants
nucleic acids
enzyme kinetics
reproductive organs
bird classification
circulatory system
ecosystems
excretion
transpiration
endocrine system
evolution
locomotion
genetic mapping
photosynthesis
population growth
respiration
heart
nervous system
digestive system
anatomy

Math

fractions
linear equations
decimals
quadratic equations
perimeters
sines and cosines
circumference
calculus
angles
scientific notation
differential equations
percentages
geometry
long division
number theory
graphing
algebra
trigonometry
factoring
probability
matrix manipulation
Fourier analysis

Astronomy

solar system
constellations

Computer-Science Tutorials

BASIC
Logo
Pascal
Assembler

Religion

Bible
Jewish history

How-To's

play bridge
draw a floor plan
play the guitar
grow vegetables
repair your car
take photographs
redecorate your home
touch type
landscape your yard

Hobbies

catalog your stamp collection
classify your coin collection
chart your horoscope
design your own needlework
study I-Ching or numerology
write your own crossword puzzles
monitor your biorhythms
trace your roots (genealogy)
keep track of running times and distances

Home

recipes
checkbook balancing
address book
security-system control

Self-Help

build negotiation skills
improve self-esteem
lose weight

Chapter 6: Peripheral Devices

Wouldn't it be nice if the Apple IIgs had a built-in printer, plotter, monitor, modem, 3.5-inch disk drive, 5.25-inch disk drive, hard disk drive, joystick, hand controls, graphics tablet, digitizer, and assorted home control devices?

Wouldn't it be nice if you had a desk big enough to hold such a machine?

Even if size and cost weren't factors, the problem with built-in peripheral devices is that

different users have different needs. The plotter that is indispensable to the landscape architect preparing a presentation is useless to the writer. With the Apple IIgs, there's no limit to what you can attach, and no reason to attach anything you don't want or need.

Connecting Peripheral Devices

There are two ways of connecting peripheral devices to the Apple IIgs: by using the ports on the back or by using the slots on the main circuit board inside the case. The advantage of using ports is that it's easy: you just run a cable from the device to the computer. The advantage of using slots is that you can connect a wide variety of devices to the computer; you aren't limited to the devices for which there are ports.

Ports and Slots

Most of the ports on the back of your Apple IIgs are designed for a particular type of peripheral device (the keyboard, a joystick, disk drives, a monochrome monitor, or a color monitor), and the instructions that tell the computer how to work with that device are stored in ROM (the permanent memory of the computer).

These are general-Gloss purpose serial ports, and you can change their configuration so that the computer can talk to a variety of different peripheral devices. You change the configuration of the serial ports by using the Control Panel Program.

If you connect a printer to the printer port, and a modem to the modem port, you probably won't have to change the configuration of the ports. Try using the device before you change the port settings.

Slots are for connecting devices that need to exchange information with the computer in a special way. The instructions that tell the computer how to communicate with that device are on the interface card you put in the slot. (The slot itself is just a plug that opens the lines of communication between the computer and the information on the card.)

Specifying the Location of Peripheral Devices

Many applications will ask you to specify the location of a peripheral device by its slot number and, for a disk drive, by its drive number. If your device is connected through an interface card in a slot, you won't have any difficulty providing the slot number. But how do you specify the slot number of a device connected to a port? You consult Table 6-1 and supply the slot equivalent for the port. Ports were designed to emulate slots so that applications could run on all models of the Apple II whether they had slots only (like the Apple IIe), ports only (like the Apple IIc), or both slots and ports (like the Apple IIgs).

By convention, 3.5-inch drives are connected to a card in slot 5, 5.25-inch drives are connected to a card in slot 6, a printer is connected to a card in slot 1, and a modem is connected to a card in slot 2. The ports follow this convention in emulating slots.

Important   The operating system only supports two devices per slot. If you have more than two slot 5 devices (if you have two 3.5-inch drives and a RAM disk, for example), the third and fourth slot 5 devices appear to be connected to a card in slot 2. Slot 2 is the overflow slot for slot 5 devices.

Specifying the Drive Number

In general, the drive connected directly to the port is drive 1, the next drive of that type is drive 2. If you have both 3.5-inch drives and 5.25-inch drives connected to the disk drive port, the 3.5-inch drives should be closest to the computer in the chain. The 5.25-inch drive nearest the computer is drive 1, the 5.25-inch drive farthest from the computer is drive 2. If

you have used the Control Panel to designate your RAM disk as your startup disk drive, it is drive 1 in slot 5. If a 3.5-inch drive is designated as your startup drive, the RAM disk is drive 2 in slot 5.

Choosing Peripheral Devices

Here are some things to think about when you're evaluating any peripheral device:

Does it work automatically with the Apple IIgs and your application? It doesn't matter how many fancy features a printer or modem has if you can't get it to work with your computer.

Does it have all the features you want not just the features you need today, but the features you'll want down the road? You should buy hardware the way you buy clothes for kids with room to grow.

How much does it cost? You should do some comparison shopping, but don't trade away compatibility with your software or the features you need just to get a bargain.

What kind of service and support come with the hardware? Is there an adequate warranty period? Can you get inexpensive service coverage?

Printers

A printer produces a paper copy of documents you create with your computer. Some are designed exclusively for printing text; others are especially good for illustrations and can even print in color. Decide what's important to you and look for a printer that meets your needs.

The single most important consideration in choosing a printer is compatibility with your software. You want to be able to choose the Print command from the menu without worrying about whether your printer will know how to interpret the bits that come streaming out the printer port and down the cable. Most applications designed for the Apple II work automatically with the ImageWriter, the ImageWriter II, and printers advertised as being compatible with the ImageWriter.

Graphics-based applications, and some word processing programs are graphics-based, usually require a dot matrix printer. Make sure you get a printer that works with your applications.

The second most important consideration is print quality. Do you need text that looks as if it came from a typesetter, or is it OK if you can see the little dots that make up each character? In general, you'll get the most professional quality from a daisy wheel printer. But not everyone needs professional quality, and other types of printers are cheaper and can do more things—like graphics.

The most common types of printers are dot matrix, daisy wheel, and thermal transfer printers.

Desktop publishing: If you need typeset-quality printing, a fourth option is a laser printer, like the Apple LaserWriter. Laser printers are more expensive than other types, but for professional-quality printing, they are fast and save you the cost of having your work typeset.

Dot Matrix Printers

Dot matrix printers form characters with patterns of dots. They're fast, economical, ideal for graphics, and fine for drafts, memos, and personal letters. Because of the way they form characters, dot matrix printers can produce a wide variety of type sizes and type styles (boldface, italic, and so on) so you can create headlines and other special effects. You can even get dot matrix printers that print in color.

The only drawback to dot matrix printers is that, with some of them, you can see the pattern of dots that make up each character. This can give your documents a look that people associate with computer printouts. If you need a printer that can produce professional letter quality documents, you may need a daisy wheel printer. But check the quality of dot matrix printers before you decide; you may not be able to tell the difference between text produced with a good dot matrix printer and text produced with a daisy wheel printer.

Daisy Wheel Printers

Daisy wheel printers, also known as letter quality printers, form characters the same way high-quality typewriters do by rotating a print wheel until the right character is aimed at the paper and hammering that character into a ribbon that leaves the appropriate symbol on the page. Daisy wheel printers are slower and more expensive than dot matrix printers, but if the appearance of your correspondence is important and you don't need graphics, a daisy wheel printer may be the right choice for you. Most daisy wheel printers use a circular print wheel (they look something like a daisy) to produce fully formed characters.
Keep in mind that daisy wheel printers limit you to the characters on the print wheel, whereas a dot matrix printer can print graphics and a variety of type fonts and sizes.

Near letter quality: Near-letter-quality printers (sometimes called letter matrix printers) are dot matrix printers that use so many dots to form each character that they appear to have been formed with a daisy wheel printer.

Thermal Transfer Printers

Thermal transfer printers transfer ink dot characters onto paper by heating the ribbon. They are inexpensive and quiet. The print quality varies quite a bit among different kinds of thermal printers. Some are good enough for correspondence; others are suitable only for drafts and interoffice memos. Some thermal printers require specially treated paper. Check the price and availability of the special paper before deciding on what kind of printer to get.

Modems

A modem, short for modulator/demodulator, is a device that converts (modulates) computer signals into tones that can be sent over phone lines. A modem on the receiving end converts (demodulates) the signals to their original computer-readable form.

There are two kinds of modems: acoustic-coupler and direct-connect. With an acoustic-coupler modem, you put the telephone handset into a pair of rubber cups. With a direct-connect modem, you plug the modem directly into the phone jack.

The advantage of an acoustic-coupler modem is that you can use it from a phone that doesn't have a removable phone cord. The advantage of a direct-connect modem is that the phone signals don't have to travel through the handset, so there's less distortion.

Different modems send and receive information at different speeds, measured in bits per second (bps), often referred to as the baud. The most common baud for modems is 1200. You can also get modems that send and receive data at 300 baud, 2400 baud, or at your choice of speeds.

Modems that operate at 1200 baud cost more than 300-baud modems, but they're much faster. Because you may be paying long-distance phone rates while your modem is sending and receiving information, the time you save with a faster modem usually justifies the higher initial cost.

Monitors

There are two types of monitors: monochrome and color. Monochrome monitors come in three varieties: white, green, or amber on black. Some studies indicate that an amber display is

easier on the eyes; others, that a green display is easier to read. Some people prefer black and white because it more closely resembles a typewritten page. The best choice is the one that looks best to you.

Color monitors are ideal for computer graphics and for displaying business charts and graphs. Until recently, they didn't have good enough resolution to display text, so people who wanted a computer to do both text and graphics had to get two monitors or settle for monochrome graphics. Today you can get color monitors capable of displaying both graphics and clear text.

Color monitors come in two varieties: RGB (Red Green Blue) and NTSC (National Television Standards Committee). NTSC monitors are less expensive than RGB monitors, and the quality of the display reflects the difference in price. If you use color applications regu-larly or for important presentations, it's probably worth investing in an RGB monitor.

RGB monitors can display color text clearly. NTSC monitors usually switch into black-and-white mode for displaying text. (If they didn't, you'd see a color fringe around the characters.)

Important   There are two kinds of RGB monitors: analog and digital. The Apple IIgs supports analog RGB monitors. RGB color monitors de-signed to be connected to the AUX. CONNECTOR slot in the Apple IIe are digital RGB monitors and cannot be connected to the RGB port on the Apple IIgs. Be sure the monitor you get is compatible with the Apple IIgs.

Using a Television as a Display Device

You can use a standard television set (with a device called an RF modulator) as a display device for the Apple IIgs, but you're limited to a 40-column display. While 40 characters per line is fine for some applications (games and educational applications), most people find it restrictive for business letters or electronic spreadsheets. And many business applications require an 80-column display.

Disk Drives

Disk drives record information on disks and retrieve information from disks. Sometimes the information is an application; some-times, a document. It's all the same to the disk drive.

3.5-Inch Disk Drives

The most popular type of disk drive for the Apple IIgs is the 3.5-inch drive. It uses 3.5-inch disks that each hold 800K (about 400 pages) of text. You can attach one or two of them to your computer. The advantage of having two drives is that you can use one for the application program disk and one for the document disk. (If you have only one drive, you have to trade your application disk for your document disk when you want to save your document.)

5.25-Inch Disk Drives

You can also use 5.25-inch drives with the Apple IIgs (or a combi-nation of 3.5-inch and 5.25-inch drives). The 5.25-inch drive uses 5.25-inch disks that each hold 143K (about 70 pages) of text. The 5.25-inch drive was the original disk drive (and for many years the only type of disk drive) available for the Apple II. Consequently, lots of people own them, and thousands of applications are still sold on 5.25-inch disks. The 5.25-inch drive stores less information per disk, accesses that information a little more slowly, and takes up more desk space than the 3.5-inch drive, but it's 100% compatible with the Apple IIgs, and it makes sense to use one if you already have a library of 5.25-inch application program disks or you share disks with others using 5.25-inch drives.

Hard Disk Drives

If you use your computer for accounting or you work with large data bases, you should consider a hard disk drive. A hard disk drive can store the equivalent of dozens of 3.5-inch disks. It's a fast and convenient way to get at your data. The hard disk stores your data on platters permanently sealed inside a plastic case. Besides storing documents on a hard disk, you can store applications on it and switch between applications without swapping disks.

Memory Expansion Card

A memory expansion card adds from 256K to 1 megabyte of RAM to your Apple IIgs. By installing a memory expansion card in your Apple IIgs, you can take advantage of applications that require more memory because of their use of graphics and other memory-gobbling features.

Many applications designed especially for the Apple IIgs will use the extra memory on the card automatically as an extension of the memory that's built into the computer. You don't need to know anything special to use the card in this way; just install it and leave the rest up to the application.

For applications that don't take advantage of the memory on the card automatically, you can use the Control Panel to designate some or all of the memory on the card as a RAM disk memory that you access like a disk. The advantage of using the card as a RAM disk is that when you copy an application to the RAM disk and run it from there, the computer can access different parts of the application much more quickly than it can when the application is on a regular disk.

Other Devices

There are all sorts of other things you can attach to your computer. This list will give you some idea of the possibilities. Incidentally, if a joystick, graphics tablet, plotter, or some other device is described as an Apple Desktop Bus device, it means you can attach it to the Apple Desktop Bus on the back panel of the Apple IIgs (where the keyboard is usually plugged in) or to the connector on the keyboard (where the mouse is usually plugged in).

Joysticks and hand controls: Joysticks and hand controls are mostly used to control the movement of creatures and objects in games.

Digitizer: A digitizer takes a photograph and converts the image into a digital form that the computer can display on the screen, save on a disk, and print.

Plotter: A plotter uses colored felt-tip pens to draw graphs, charts, floor plans, Logo drawings, and other graphics created with the Apple IIgs.

Graphics tablet: As the name implies, a graphics tablet is a device for drawing pictures. A special pen sends out signals that are detected by wires in the tablet and sent to the computer as X and Y coordinates that can be displayed on the screen. The pen works only with applications designed to receive input from a graphics tablet.

Home control device: A device that you can attach to an electrical outlet and program to turn on a light, a coffee maker, radio, sprinkler, or other appliances.

Printer buffer: A printer buffer is a place to store information you're printing. By loading information into the printer buffer, you can get it out of the computer's RAM and free up the computer so you can start writing Chapter 2 while Chapter 1 is printing.

Tape backup device: A device that uses magnetic tape to duplicate quickly the information stored on a hard disk.

Co-processor: A co-processor is a microprocessor that works with or overrides the microprocessor that comes with your computer. The main reason you'd get one is to take

advantage of software developed for other computers software that wouldn't otherwise work on an Apple IIgs. The most popular co-processor for the Apple IIgs is the Z80 processor, which lets you run applications based on the CP/M operating system. By plugging a Z80 card into your Apple IIgs, you can select from over 20,000 CP/M-based applications, many of them free (public-domain) software.

CD ROM Player: CD stands for compact disc. A device that reads information from 550-megabyte disks by using laser technology. Information stored on CD ROM disks can be loaded into memory, displayed on the screen, and printed, but you can't store your own data on the disks.

Musical Instrument Digital Interface (MIDI) card: An interface card that lets you use your Apple IIgs as a music synthesizer and as a control device for electronic keyboards and drum machines.

Light pen: A peripheral device shaped like a pen that sends instructions to the computer when you point to choices on the screen. It works only with applications designed to receive input from a light pen.

Adaptive devices for the disabled: Contact the National Rehabilitation Information Center (NARIC), Closing the Gap, or the Trace Research and Development Center for information on adaptive devices available for the Apple II family of computers, including speech synthesizers, voice input devices, braille keyboards and printers, breath-operated keyboards, and optical keyboards operated with light pens.

Appendix A - The Control Panel Program

The Apple IIgs is a versatile machine. You can control the speed of the microprocessor, the color of the text and background displayed on the screen, the responsiveness of the keys on the keyboard, the volume of the built-in speaker, and more. The way you control these things is through the Control Panel, a program that is built into the Apple IIgs.

While the Control Panel Program is permanently stored in the Apple IIgs, your system preferences are recorded in a special kind of battery-powered RAM that, unlike ordinary RAM, retains what's stored in it even after the power is turned off. This means you can make changes to your system configuration and save the configuration for next time. The battery should last between five and ten years.

If it ever runs low, the Control Panel Program restores the original system configuration. If this happens, have your authorized Apple dealer replace the battery; then use the Control Panel Program to reconfigure your system the way you like it.

Incidentally, applications can override your settings for special effects and special reasons of their own. For example, you may have the speed set to normal, but the application can override your setting and run at the faster speed.

Getting to the Control Panel Program

To get to the Control Panel Program, hold down Option while you turn on the Apple IIgs power switch.

Press 1 to enter the Control Panel. The only time you should choose a menu item other than 1 is if you need to restore the standard Control Panel settings for the U.S. (press 2) or if you change your mind about entering the Control Panel (press 4).

Important   Do not press 3 unless you are operating your Apple IIgs in a country where the standard signal frequency for monitors is 50 hertz. If you choose the wrong hertz setting, the

image on your monitor will roll or be out of alignment. To restore the standard U.S. settings, press Option-Control-Reset. Then press 2.

If the power is already on, you can get to the Control Panel Program by pressing Option-Control-Reset or Apple key-Control-Esc. Pressing Option-Control-Reset restarts the computer, so you should use Apple key-Control-Esc to get to the Control Panel if you are in the process of using an application and want to return to your application after using the Control Panel Program.

Pressing Apple key-Control-Esc from an application brings up the Desk Accessories menu, rather than the screen you get by pressing Option-Control-Reset.

Desk Accessories Menu

By the way: Some programs don't send you to the Desk Accessories menu when you press Apple key-Control-Esc. If that's the case with an application you're using, you won't be able to use desk accessories while using that application. However, you can get to the Control Panel before or after using that application by starting up with the Option key pressed down or, if the power is on, by pressing Option-Control-Reset. If it's a ProDOS-based application, have your authorized Apple dealer upgrade the application with ProDOS 1.2 and you will be able to access desk accessories while using your application.

Desk accessories are mini-applications, like a calculator and a notepad, that you can use without leaving your main application. The Control Panel is different from other desk accessories in that it is stored in the permanent memory of the computer, not in RAM with the other desk accessories, but you can access it the same way you access other desk accessories, by pressing Apple key-Control-Esc. If you haven't loaded any other desk accessories into memory, the Control Panel and Alternate Display Mode will be the only options on the Desk Accessories menu besides Quit.

Alternate Display Mode: The Apple IIgs displays information differently than earlier models of the Apple II. This interferes with the display of a few applications. Choosing the Alternate Display Mode desk accessory temporarily makes the display work the old way so those applications can run. When you're finished with the application, choose the accessory again to turn off Alternate Display Mode. The Alternate Display Mode is turned off automatically when you restart the computer.

Choose the Control Panel Option

The Control Panel Program Main Menu lists all the functions you can customize. To select from the list of options:

Press Up Arrow or Down Arrow to highlight the option you want.
Then press Return.

Depending on which option you select from the Main Menu, you'll see a secondary display.

To change one of the settings:

Press Up Arrow or Down Arrow to highlight the setting you want to change.

Press Right Arrow or Left Arrow until you see the setting you want. (The original settings are marked with a check in case you want to put things back the way you found them.)

Press Return to save the setting (or Esc if you decide you don't want to change the setting after all). You'll return to the Main Menu.

Choose Quit. If you got to the Control Panel by pressing Apple key-Control-Esc from an application, you'll return to that application. If you got to the Control Panel by pressing Option-Control-Reset, the computer will start up the appli-cation in your startup drive.

If you need more specific instructions, go through the example in Chapter 1 that shows you how to use the Control Panel Program to set the Apple IIgs's built-in clock.

The sections that follow describe Control Panel options, system characteristics you can change and reasons you might want to change them.

Display

Use the Display option to set the type of display (color or mono-chrome), the number of columns of text displayed, and the color or shade you'd like for text, background, and border.

Type

If you're using a color monitor, select Color as the type of display. If you're using a monochrome monitor or a television set, select Monochrome.

Incidentally, if the text displayed on your color monitor is fuzzy or has a color fringe when you use certain applications, try changing the type to Monochrome and see if you get a better picture. If there isn't enough contrast with a monochrome monitor, try setting Type to Color.

Columns

The Apple IIgs can display either 40 columns by 24 lines of text or 80 columns by 24 lines. If you choose 40 columns, the characters are twice as wide as the characters you get when you choose 80 columns. The advantage of the 40-column display is that the characters are bigger and easier to read. The advantage of the 80-column display is that you can work with larger documents, and the documents have a line length that more closely resembles type-written documents.

Television sets and some color monitors don't have good enough resolution to display 80 columns of text clearly, so if you're using a television set or if you're having trouble reading text produced by your color monitor, set the Columns option to 40.

If you're using a monitor, and particularly if you use your Apple IIgs with business applications (like word processing and spreadsheet applications), set the Columns option to 80. Some applications require an 80-column display.

Some applications will override this setting and select the number of columns for you. Many games and educational applications are designed for a 40-column display.

Screen Colors

If you have a color display, you can choose the color of your text, background, and border from 16 colors. If you have a mono-chrome monitor, you can choose the shade of your text, back-ground, and border from black, white, or 14 shades of gray. These settings affect only text-based applications.

NTSC color monitors switch to black-and-white mode to display text, so the text and background colors you select with the Control Panel will show up as shades of gray instead of in color. Only the border will be displayed in color.

As you change one color or shade to another by using Left Arrow and Right Arrow, the Control Panel displays the name of the color you've chosen and shows you what your selection looks

like.

Important   If you are using an NTSC color monitor, the colors you select won't show up in color
while you're using the Control Panel Program or other text-based applications. You will see the
text and background in color only when you're using graphics-based applications that display
text in the text portion (the bottom four lines) of the graphics screen.

Choosing Color of Text, Background, and Border

After experimenting with different colors or shades, you may decide you liked the original
colors best. To restore the preset colors, use Left Arrow or Right Arrow to change the Standard
Colors option to Yes. If you decide you don't like the standard colors after all, you can
change them by using the Text, Background, and Border options. You can't change the Standard
Colors setting to No as a way of restoring your previous settings.

Important   If the color contrast between text and background is such that you can't read the
text to change the settings to something more readable, first try adjusting the contrast knob
on your monitor. If that doesn't help, you can restore the original Control Panel settings by
pressing Option-Control-Reset and then pressing 2.

If you don't want a border, set the background and border to the same color or shade of gray.

Hertz

The hertz setting indicates the frequency of signals sent to the monitor. Different countries
have different standards; the U.S. standard is 60. This is not a matter of preference. If you
need to change the hertz setting, if the image on your screen is rolling or out of alignment,
press Option-Control-Reset. Then press 2. This restores the standard Control Panel settings for
the U.S., including the correct hertz setting.

Sound

With the appropriate applications and peripheral devices, the Apple IIgs can play music and
even simulate speech. Even the stuffiest software uses a bell or beep to accompany an error
message. The Sound option lets you change the volume of sounds and the pitch of beeps generated
by applications.

This option works a little differently than the others. Instead of using Left Arrow and Right
Arrow to move through a list of choices, you press Left Arrow to reduce the volume and Right
Arrow to increase the volume. The asterisk on the indicator bar will move to the right or left,
and you'll hear a beep to reflect your action.

System Speed

The Apple IIgs can operate at two speeds: fast and normal. Fast refers to the speed of the
Apple IIgs when it's operating at a maximum speed of 2.8 megahertz (MHz), the top speed
possible on the Apple IIgs. Normal refers to the speed of the Apple IIgs when it's operating at
a maximum speed of 1 MHz, the top speed possible on earlier models of the Apple II.

Fast, the standard setting, is best for applications developed specifically for the Apple IIgs
and for any Apple II application that involves a lot of calculations and sorting. The only time
you have to change the speed to normal is when the fast speed throws off the application's
timing or keeps it from running properly.

If you change from Normal to Fast system speed after starting up an application, you may have
to restart the application by pressing Apple key-Control-Reset before the Fast speed will take
effect.

Clock

You already had some exposure to the Clock option when you learned how to change the date and time. You can also use this option to change the date format from month first to day first or year first and to change the way time is displayed from the AM/PM format to the 24-hour format.

Options

Display Language and Keyboard Layout

The Display Language and Keyboard Layout options let you customize the character set and keyboard layouts for a variety of international keyboards or for the Dvorak keyboard. The Dvorak keyboard layout is an arrangement of keys designed to increase typing speed and efficiency by locating the keys used most often in the home row. The Dvorak keyboard is also called the American Simplified Keyboard.

Keyboard Buffering

The keyboard buffer is a special part of RAM where keystrokes are stored when the computer is busy and can't deal with them immediately. The buffer can keep track of up to 256 keystrokes. (After that, keystrokes are ignored.) This lets you type a series of instructions to the computer while the computer is doing something else, like saving a document on a disk. If you find this feature getting you into trouble (if you find yourself typing instructions that you later repent), you can turn off the keyboard buffer by using the Keyboard Buffering option.

Repeat Speed

When you hold down a key instead of pressing and releasing it, the key repeats, like thissssssssss. You can change the speed at which keys repeat by using the Repeat Speed option. Press Right Arrow to make keys repeat faster; Left Arrow to make keys repeat slower.

Repeat Delay

You can use the Repeat Delay option to change the amount of time it takes from the time you press and hold down a key until it starts repeating.

Double Click

Double clicking means pressing and releasing the mouse button twice in rapid succession. It's a shortcut you'll learn about when you use mouse-based applications. The application interprets your two clicks as a double-click only if the two clicks are done within a certain time interval. You can change the time interval by using the Double Click option.

Cursor Flash

In many applications, the cursor flashes to distinguish it from other characters on the screen. You can speed up or slow down the interval between flashes by using the Cursor Flash option.

Advanced features

The next few features are somewhat esoteric, but if you think they might be useful, give them a try.

Shift Caps/Lowercase

Ordinarily, when you push Caps Lock down, everything you type is capitalized; to get lowercase

characters, you have to release Caps Lock. But by setting the Shift Caps/Lowercase option to Yes, you can have Caps Lock down and get lowercase characters by holding down Shift while you type. In other words, by activating this feature, Shift has the opposite effect that it does when Caps Lock is not pressed down.

Fast Space/Delete Keys

When you hold down the Space bar, the space repeats like any other character, and you get a row of spaces. Likewise, when you hold down Delete, successive characters are deleted until you release the key. By setting Fast Space/Delete to Yes, you can double the speed of these two actions by holding down Control while holding down Space or Delete.

Dual Speed Keys

Setting the Dual Speed Keys option to Yes doubles the speed at which the cursor moves when you hold down an arrow key while pressing Control.

High Speed Mouse

When you move the mouse across your desk, a pointer moves a corresponding distance across your screen. Setting the High Speed Mouse option to Yes makes the pointer move twice as far for the same movement of the mouse. It's useful if you're short on desk space.

Activating Slots or Ports

Software designed for earlier models of the Apple II expects to find devices connected to slots inside the computer. For this reason, each port on the Apple IIgs is designed to impersonate a slot containing a card.

Slots and Ports

Device	Connected to	Looks like a card in
Printer	Printer port	Slot 1
Modem	Modem port	Slot 2
Mouse	Mouse port	Slot 4
3.5-inch drive	Disk drive port	Slot 5
5.25-inch drive	Disk drive port	Slot 6
Personal Network	Printer or modem port	Slot 7

About the disk drive port: When 3.5-inch drives are connected to the disk drive port, they appear to be connected to a card in slot 5. When 5.25-inch drives are connected to the disk drive port, they appear to be connected to a card in slot

When the disk drive port impersonates a card in slot 5, it's described as a smart port.

Because each port impersonates a slot, you can't have both the port and the corresponding slot active at the same time. You activate one or the other by using the Slots command.

When you have an AppleTalk network cable connected to the printer or modem port, the port impersonates a card in slot 7, not slot 1 or 2 as you would expect. But because the AppleTalk cable plugs into one of the two serial ports, the Control Panel Program won't let you activate the printer port, the modem port, and AppleTalk all at the same time.

Changing the Startup Drive

When you turn on the Apple IIgs power switch, the first thing the computer does is check its

slots for a disk drive controller card, an interface card that controls one or two disk drives.
It looks first at slot 7, the highest-numbered slot. If it doesn't find a disk drive controller
card there, it looks in slot 6, the next-highest-numbered slot, then slot 5, and so on, until
it finds a disk drive controller card. When it finds a disk drive controller card, it checks
the disk drive connected to that card for a startup disk. This method of looking for a startup
device is called scanning.

Generally this system works fine, but what if you want to bypass the disk drive connected to
slot 6 and start up from the disk drive connected to slot 5? What you do is change the startup
slot from Scan, the standard setting, to slot 5 or any other slot containing the drive you want
to start up from.

But what if your disk drives are connected to ports? From the com-puter's point of view, ports
look just like slots with cards in them. A 5.25-inch drive connected to the disk drive port
emulates a disk drive connected to a card in slot 6. A 3.5-inch drive connected to the disk
drive port emulates a disk drive connected to a card in slot 5. Just choose the slot that
corresponds to the drive you want to start up from.

You'll also be offered the option of starting up from a RAM disk or a ROM disk. Starting up
from a RAM disk means starting up from an application that you've copied into the memory on
your Apple IIgs memory expansion card.

You should not select the RAM disk as your startup device unless you have a memory expansion
card in the memory expansion slot and you've copied an application to the RAM disk. See the
Apple IIgs Memory Expansion Card Owner's Guide for more information.

Starting up from a ROM disk means starting up from an application permanently stored on a
memory expansion card. (Depending on what kind of memory expansion card you get, you may or may
not have applications permanently stored on a ROM disk.) The manual that came with your memory
expansion card will tell you more about starting up from a RAM disk and a ROM disk.

Changing Printer/Modem Port Settings

The printer and modem ports work a little differently than the other ports on the back panel.
Whereas most of the ports are configured to interact with a particular type of device (a disk
drive, a monitor, a joystick) in a particular way, the printer and modem ports are designed so
you can change their configuration. They are general-purpose serial ports.

Different printers and different remote computers expect to receive information at different
speeds and in different configurations. That's why it's important that you be able to change
the way infor-mation is sent.

The printer port is configured to work automatically with the ImageWriter series of printers
and with many other popular serial printers. The modem port is configured to work automatically
with most commercial information services you'll be accessing with your modem. However, if your
device requires a different configuration or if you want to use a modem in the printer port and
a printer in the modem port, you'll need to change the data configuration. There are two ways
to do this: from within an application or by using the Control Panel Program. The configuration
you specify in an appli-cation overrides the Control Panel setting for a port.

How do you know whether your application is overriding the Control Panel settings for the port?
If the application gives you a list of printers and asks you to choose yours from the list,
it's going to send the document in the correct configuration for the printer you choose and
will ignore the Control Panel settings for the port.

A tip: Even if your printer is not on the list, try selecting each of the printers on the
list. If your printer happens to have the same configuration as one of those on the list,

you'll save yourself the bother of supplying specifications about your printer.

If the application asks you to supply a list of specifications about how your printer or the remote computer wants to receive data (baud, number of data bits, stop bits, and the like), it's going to send the document according to those specifications and will ignore the Control Panel settings for the port. You should be able to find the specifications for your printer in the manual that came with it or, for an information service, in the brochure you got when you subscribed to the service.

By the way: The specifications you'll be asked for in an application are the same specifications you'll set by using the Control Panel Program, so if you aren't sure what the appli-cation means by data bits, stops bits, and parity, read the explanations in the following sections.

If the application does not give you a list of printers and does not ask for your printer's specifications, the document will be sent according to the specifications in the Control Panel for the port your printer is connected to.

Important   Try using your printer or modem before changing any of the settings. If it works, you'll save yourself some time. If it doesn't, you'll have some information (unintentional double-spacing, absence of carriage returns, lost characters, and so on) that will help you figure out which settings need to be adjusted.

If you need to reconfigure one of the ports, check the manual that came with your printer or the service you're trying to exchange information with to see what its specifications are. Then use that information to fill in the baud, the number of data bits, and so on. The following sections explain what the various specifications mean and how to decide what settings to choose.

Device Connected

The Device Connected setting is fairly straightforward. Select Printer if you're connecting a printer or plotter to the port. Select Modem if you're connecting a modem to the port.

Line Length

Line length indicates the number of characters that your printer will print per line before generating a carriage return (sending the carriage to the left margin to start a new line). Many applications let you set the line length from within the application. If that's the case or if you find the computer adding carriage returns where they don't belong, choose Unlimited and the computer won't try to control line length.

If, on the other hand, you find your printer ignoring the right margin and printing right off the page, you can use this option to insert a carriage return after every 40, 72, 80, or 132 characters.

If you're connecting a modem, leave the line length set to Unlimited.

Delete First LF After CR

Some printers and applications automatically generate a line feed (LF), go to the next line, after each carriage return (CR). Others don't. If you try printing something and everything comes out unintentionally double-spaced, make sure the automatic line feed switch on your printer is set to OFF. If you still get double spacing, the extra line feed is coming from your application. If you can't turn it off there, you can use the Delete First LF After CR option to cancel the extra line feed.

Add LF After CR

Suppose you try printing something and you don't get any line feeds, the lines are printing on
top of each other and all you get is one line of typed smudge. Set the automatic line feed
switch on your printer to ON or use the Add LF After CR option to add an extra line feed after
each carriage return.

Echo

When you send a message through your modem, you can elect to have the message displayed on your
own screen as well as on the screen it's being sent to. This is called echo, and it's a nice
way to assure yourself that your message is being sent correctly. In most cases, you won't need
to select the Echo option because the com-puter you're sending the message to will probably
send an echo of the message to your screen as a way of confirming that it received your
message. If you select the Echo option and the other modem sends an echo, you'll be seeing
double.

A full-duplex modem will echo characters back to your monitor. A half-duplex modem won't. If
you're communicating with a full-duplex modem, set Echo to No. If you're communicating with a
half-duplex modem, set Echo to Yes. If you don't know what kind of modem is on the other end of
the phone line, select Yes. If you find everything coming through double, change to No. Most
information services, like CompuServe and The Source, use full-duplex modems.

Buffering

The buffer is a special holding area in RAM that holds information until the computer or
peripheral device is ready to deal with it. Don't change this setting unless the manual that
came with your device tells you to.

Baud

The Apple IIgs can send and receive information at a wide range of speeds from 50 bits per
second to 19,200 bits per second. The important thing is that the computer and the printer or
modem agree in advance on the speed that the bits will be traveling.

Bits per second (bps) is more commonly referred to as baud, which means rate of transmission.
The computer is more adaptable about baud than the device, so check what baud the device uses
and select the same speed for the computer by using the Baud option. You'll usually find baud
listed on a specifications page in the man-ual that came with your printer or modem. The most
common baud for modems is 1200. The most common baud for printers is 9600.

Data Bits/Stop Bits

The computer sends and receives each character of data out the serial port as a string of bits.
Characters can be represented with seven or eight data bits. It doesn't matter which you choose
as long as there is agreement between the computer and the device it's communicating with. The
most common data format is eight data bits. The manual that came with the device will indicate
what setting to use.

Stop bits are used to mark the end of each string of data bits. Some devices expect to receive
one stop bit; others expect to receive two.

Parity

Some devices expect to receive a parity bit, which is used by the receiving device to make sure
the data didn't get garbled during transmission. There are three parity options you can select:
odd parity, even parity, or no parity. Most devices don't use parity checking, so if you're

unsure about what to select, choose No Parity.

If the devices agree on odd parity as an error-checking system, the sending device adds an extra bit set to either 0 or 1 to make the total number of bits add up to an odd number. For example, the 7-bit ASCII code for the letter A is 1000001, which adds up to 2, an even number. The sending device would add an extra 1 to make it odd. The receiving device adds up the bits. If the total is odd, chances are the message is OK; if it's even, there was an error in the transmission.

If the devices agree on even parity, the sending device adds an extra bit set to either 0 or 1 to make the total number of bits an even number.

Handshake Signals

DCD, DSR/DTR, and XON/XOFF are different protocols that a peripheral device can use to tell the computer things like I'm ready when you're ready or Give me a second to catch my breath. Signals that regulate the flow of data between the computer and a peripheral device are called handshake signals.

Don't change these settings unless the manual that came with your device specifically tells you to set them in a particular way.

DCD stands for Data Carrier Detect; DSR for Data Set Ready; and DTR for Data Terminal Ready. XON and XOFF are ASCII charac-ters. XOFF tells the transmitting device to halt transmission of characters. XON tells the transmitting device to resume trans-mission of characters.

RAM Disk

If you have a memory expansion card connected to your Apple IIgs, you can designate a portion of the memory on the card to be used as a RAM disk. A RAM disk is memory that is treated like a disk. You format it, access it by volume name, and copy or save applications and documents on it. The advantage of using a RAM disk is that the computer can get information from it much faster than from a disk. The disadvantage is that anything stored on the RAM disk is lost when you turn off the power.

You don't have to designate any of the space on your memory expansion card for use as a RAM disk (and there's no reason to with newer applications because they will take advantage of the extra memory automatically). But experienced users, using older applications, may want to speed up access to applications and information by using the RAM disk. This option lets you specify the minimum and maximum amount of free RAM you want to set aside for use as a RAM disk. You change the minimum and maximum amount of RAM you want to reserve for use as a RAM disk in incre-ments of 32K. The minimum amount can't exceed the maximum amount. If you try to raise the minimum above the maximum, the maximum will be automatically adjusted.

RAM disk settings don't take effect until you restart the computer by pressing Apple key-Control-Reset.

Note: Decreasing the maximum RAM disk size won't erase what's already stored on the RAM disk.

Appendix B - Troubleshooting

Making mistakes is part of the learning process, the easy part. The hard part is figuring out what went wrong and fixing it. That's the purpose of this appendix.

Important   If the problem involves a loose connection, turn off the power and wait at least 30 seconds before connecting anything to or disconnecting anything from the computer.

You don't hear anything from your disk drive when you turn on the power.

The disk drive isn't plugged into the computer, or the Control Panel setting   for Startup Slot
is wrong.

Turn off the computer's power and plug it in. If that's not the problem, check
the Control Panel slot settings.

The computer tries to start up by using the wrong disk drive.

Unless you've used the Control Panel Program to change the startup slot, the
computer will attempt to start up by using the disk in the disk drive connected to the
highest-numbered slot or corresponding port.

A 5.25-inch disk drive in the disk drive port corresponds to slot. A 3.5-inch disk drive in the
disk drive port corresponds to slot.

The program starts up but doesn't tell you what to do. All you see is a square   bracket and
the cursor.

The program on the disk isn't self-starting. (You're most apt to run into this situation if
you're using programs written by friends, acquired at a users-group meeting, or downloaded from
a bulletin board.)

Type CATALOG and press Return. This should produce a list of what's on the disk.
You can use any of the programs with the letter A in front of them by typing RUN, the name of
the program, and then pressing Return. You can use some of the
programs with the letter B in front of them by typing BRUN, the name of the program, and then
pressing Return. (The letters A and B refer to file types.)

Nothing appears on your screen when you turn on the power.

The monitor's power switch is off, or the monitor isn't plugged into the computer or into a
power source, or the monitor's contrast needs adjusting.

Make sure the monitor is turned on and plugged into both the computer and a power source and
that the contrast is adjusted properly.

The computer doesn't recognize your UniDisk 3.5.

Your UniDisk 3.5 is connected to a disk drive controller card instead of to the disk drive port
and you're using the Fast system speed.

Connect your UniDisk 3.5 to the disk drive port or change System Speed in the Control Panel to
Normal.

You get the message UNABLE TO LOAD PRODOS.

Fast speed might be interfering with the application.

Try setting System Speed in the Control Panel Program to Normal.

Typing PR# and a slot number activates one of your disk drives instead of the device you intended.

The Control Panel is set to Your Card for that slot. When it can't find a card, it doesn't know what to do. Change the Control Panel setting to the port instead of Your Card.

If your disk drive keeps spinning, press Control-Reset to stop the disk drive.

Starting Up DOS 3.2 Applications

You can't start up DOS 3.2 applications on the Apple IIgs directly, but you can start them up by using a program called START13 on the DOS 3.3 System Master disk. If you don't have the disk, see if you can get a copy from someone at your local Apple users group or from your authorized Apple dealer.

The procedure for using START13 is explained below:

Start up the DOS 3.3 System Master disk.

Type RUN START13 and press Return. You'll see the message:
13-SECTOR BOOT UTILITY SLOT TO BOOT FROM (DEFAULT=6)?

Remove the disk, put the DOS 3.2 disk in drive 1, and press Return to indicate that your disk controller card is in slot 6 or the corresponding port. (If your disk drive controller card is in some other slot, type the slot number before you press Return.)

Trouble Stopping

Whenever possible, it's better to quit an application than to just turn off the power. If your application doesn't have a Quit option on the menu, try these escape methods (until you find one that works):

Press Q (for Quit).
Press Esc.
Press Control-C.
Press Control-C, then press Return.
Press Control-Reset.
Press the Apple key-Control-Reset.
Turn off the power switch.

You get the message I/O ERROR (Input/Output) on your screen.

the disk out of having trouble exchanging information with a peripheral
device. Most of the time, it points to a problem with a disk drive. (With 5.25-
inch drives, you get this message if the drive door isn't shut.)

Take the disk out of the disk drive and see if it's the one you thought it was. If it's not,
replace it and repeat what you were doing when you got the error message. Check to make sure
your printer and disk drive are securely plugged into the computer.

You can also get this message if your drive is connected to slot 1, 2, or 3 and you're using
the Fast system speed.

Disk II controller Switch to Normal speed or connect the drive to slot 4, 5, 6,
or 7. I/O is slowed down automatically in these slots for Disk II controller
cards so you can use software designed for earlier models of the Apple II.

You get the message SYNTAX ERROR on your screen.

This is a general-purpose error message that tells you the computer didn't
understand your last instruction. Sometimes you get this message when you
type something in lowercase letters and the application wants it in uppercase letters.

Check your typing. If you have made a mistake, retype the command. If that wasn't the problem,
try pressing Caps Lock down and typing your entry again.

You can't get to desk accessories by pressing the Apple key-Control-Esc.

Your application uses a version of ProDOS earlier than 1.2, which doesn't give
you access to desk accessories. Sometimes you get this message when you type something in
lowercase letters and the application wants it in uppercase letters.

Have your authorized Apple dealer upgrade the application to ProDOS 1.2.

The Desk Accessories menu appears unexpectedly.

You tried to access desk accessories earlier from an application that didn't let
you. The computer held on to your request and complied as soon as possible.

Choose Quit from the Desk Accessories menu. Have your authorized Apple dealer
upgrade the version of ProDOS on your application disk so you can access desk
accessories when you want to.

The application works on an Apple IIe but not on an Apple IIgs.

Fast speed might be interfering with the application.

Try setting System Speed in the Control Panel Program to Normal.

Every application has its own set of error messages geared to that application. In the best applications, error messages are self-explanatory. They tell you what went wrong and how to fix it. But in other applications, the messages are cryptic, and you'll have to look up the meaning of the message in the manual that came with the application.

Trouble Using the Keyboard

Delete won't delete.

Earlier models of the Apple II didn't have Delete, so applications designed for those machines use some other key or combination of keys to delete text.

The manual that came with the application will tell you some other way to erase text. Usually you'll be able to erase by pressing Left Arrow.

The cursor doesn't move when you press the arrow keys.

Earlier models of the Apple II didn't have Up and Down Arrows, so applications designed for those machines use some other way of moving the cursor.

Read the manual that came with the application to find out how to move the cursor up and down.

The cursor doesn't move past the last line of your document.

That's how the application is meant to work.

Press Return to move the cursor beyond the bottom boundary of your document and resume typing.

The application says to press a key but doesn't respond to the key-press. (You've already checked to make sure the keyboard is plugged into the Apple IIgs.)

If this is the first thing that happens after you start up, the application may be one that requires you to type everything in uppercase letters. Early models of the Apple II didn't give you the option of typing lowercase characters.

Press Caps Lock and you should have no trouble using the application.

The application tells you to press the solid Apple key but there is no solid Apple key on your keyboard.

The application was designed for the models of the Apple II that have a solid Apple key.

Press Option whenever the application says to press the solid Apple key.

Trouble Using the Mouse

You run out of space on your desk before the mouse pointer on the screen reaches your
destination.

You started your mouse move too near the edge of your desk or too near the stack
of books and papers in the middle of your desk.

Lift the mouse off the desk and move it back to the center of the desk. The pointer won't move
until you put the mouse back on the table and move it.

Mouse won't respond. You've already checked to make sure it's plugged inand that the
application is designed for use with a mouse.

Mouse port is turned off in the Control Panel.

Change slot 4 from Your Card to MousePort in the Slots section of the Control Panel.

The mouse movements are jerky.

The ball on the bottom of the mouse is probably grimy.

Clean the mouse ball according to the directions that follow.

Cleaning the mouse

Turn the mouse over. On its belly you will see a black, plastic disc with a hole in its center.
The disc has a round mark near its edge, which should be pointing to the letter L (for locked)
engraved in the mouse.

Turn the disc counterclockwise one-eighth of a turn. This will bring the mark on the disc
opposite the letter O (for open).

Cup your hands around the mouse and turn it right side up. The disc will fall out with the
ball.

Wipe the ball clean. If it's greasy, wash it with warm, soapy water and dry it thoroughly with
a lint-free cloth.

Turn the mouse back upside down. If there is any material in the hole on its bottom, gently
pick it or shake it out. Do not try to blow it out. This may just drive the material farther
inside. Do not attempt to wash out the cavity or use solvents in it.

Place the clean ball back in its hole.

Replace the plastic disc, orienting it so that the mark on its rim is near the letter O. Turn
it one-eighth of a turn clockwise, bringing the mark to the letter L. This should lock the disc
in place.

Trouble With the Display

The image on the screen is rolling or out of alignment.

The Apple IIgs is sending signals to the monitor according to the foreign standard (50 hertz) instead of the U.S. standard (60 hertz).

Press Option-Control-Reset and then press 2. This restores the standard Control Panel settings for the U.S., including the standard frequency of 60 hertz.

Text is fuzzy and unreadable. (You've already checked to make sure the monitor cable is plugged securely into the computer.)

You're using a television set or a color monitor as a display device, and the application is displaying text in 80-column format. Television sets and some color monitors don't have sharp enough resolution to display the smaller character size. If that's not the problem, maybe the contrast is too bright or too dim.

If the application gives you a choice between a 40-column and an 80-column display, choose 40. If the application doesn't give you a choice, use the Control Panel Program to change the Columns option to 40. If that isn't the problem, try adjusting the contrast knob on your monitor.

Text and background colors are so similar that the text is unreadable.

There isn't enough contrast between text and background.

Try adjusting the contrast and brightness on your monitor. If that doesn't improve the contrast, you can restore the original Control Panel settings for text and background by pressing Option-Control-Reset and then pressing 2. If there still isn't enough contrast, try setting the display type in the Control Panel Program to Color even if you're using a monochrome monitor.

Little apples and check marks appear in a line of uppercase, inverse text.

The apples and check marks are called MouseText. MouseText characters replaced a redundant set of characters in earlier models of the Apple II. Older applications using that redundant character set will now display MouseText characters in place of uppercase, inverse text.

The MouseText characters don't affect the way an application works, so if they don't bother you, go ahead and use the application. If they do bother you, ask your authorized Apple dealer or the developer of the application if there is an upgraded version of the application.

There isn't enough contrast between colors on the display.

The application was designed for earlier models of the Apple II. The Apple IIgs generates slightly different colors.

Try a different setting for display type in the Conrol Panel Program. The display type doesn't have to match the kind of monitor you have.

The screen is full of 2's or meaningless characters.

The application was designed for earlier models of the Apple II.

Leave the application disk in the drive, press the solid Apple key-Control-Esc,
choose Alternate Display Mode from the Desk Accessories menu, and press Return. When you're
finished using the application, choose the accessory again to restore the standard display.

You can't get a color display even though you're using a color monitor.

Either the monitor is set to monochrome/black-and-white mode or you're using
an NTSC color monitor with a text-based application and that's the display you're supposed to
get. Unlike analog RGB color monitors, NTSC color monitors can't display text clearly in color
mode so they switch automatically to monochrome mode for text-based applications.

Change the switch on your monitor to color mode if there is one. If you're using an NTSC
monitor with a text-based application, you don't need to make any adjustments. You'll get a
color display when you use graphics-based applications.

The 40-column display changes to an 80-column display and clears the screen when you press
Control-Reset.

You had the Control Panel set to 80 columns, but the application was using a 40-column display.
Pressing Reset put you back in 80 columns and cleared the screen.

It's not really a problem unless you pressed Reset by mistake. Reset is in an unusual location
to keep you from pressing it accidentally.

Trouble Saving a Document

Your application asks for the slot and drive of the disk you want to save to, but your drive is
connected to the disk drive port.

Earlier models of the Apple II didn't have ports, so slot and drive number was a
logical way to identify the location of your disk.

The 3.5-inch disk drives connected to the disk drive port correspond to slot 5.
The 5.25-inch disk drives connected to the disk drive port correspond to slot 6.

Your application saves everything to drive 1, but you want to save to drive 2.

The application is saving to the default, or current, drive, the drive it thinks you want to
use.

Read the manual that came with the application to find out how to change the default drive.
Some applications have you fill out a preference form that says how many disk drives are
connected to your computer. Some have a command called
Select Volume or Set Prefix that lets you specify which disk to save to.

You get the message ILLEGAL FILENAME when you try to save a document on a disk.

Filename refers to the name of your document. An illegal file name is a name that doesn't conform to the rules for naming files.

Different applications have different requirements, but you can't go wrong if your filename starts with a letter, has fewer than 15 characters, and doesn't have any spaces or punctuation marks other than periods.

You get the message DISK WRITE PROTECTED when you try to save a document on a disk.

When a disk is write-protected, it means you can't make any changes to it.

If you write-protected the disk, you can unwrite-protect it by removing the write-protect tab from the write-enable notch (if it's a 5.25-inch disk) or by sliding the write-protect cover from the write-enable notch (if it's a 3.5-inch disk). If the manufacturer write-protected the disk, there was probably a good reason for it, and you should consider using a different disk.

You get the message DUPLICATE FILENAME when you try to save a document on a disk.

You tried to use a name you've already used on that disk.

If you're saving a revised version of a document and you gave it the same name intentionally, confirm that that's what you want to do. If you duplicated a document name by mistake, give the document a different name and repeat the save procedure.

You get the message DRIVE TOO FAST.

Your disk drive speed is too fast.

Have it adjusted by your authorized Apple dealer.

You get the message DRIVE TOO SLOW.

Your disk drive speed is too slow.

Have it adjusted by your authorized Apple dealer.

Trouble Printing

Unintentional double or triple spacing.

An extra line feed is being inserted by the application, the Control Panel Program, or the printer.

Change the application's line feed setting to OFF, or use the Control Panel Program to change the line feed setting for the printer port, or turn off the automatic line feed switch on the printer.

Lines are printing on top of each other.

No line feed instruction is being sent to the printer after the carriage return instruction.

Use the Control Panel Program to add a line feed after the carriage return for the printer port or turn on the automatic line feed switch on the printer.

Your printer doesn't print. (You already checked to make sure the printer is plugged into the computer and a power source.)

The Select button is off.

Turn on the Select button.

Your printer doesn't print, and the paper error light is on.

You're out of paper, or paper isn't feeding properly.

Reload the paper and try again.

Your printer doesn't print, and the power light is off.

You forgot to turn on the printer's power switch.

Turn on the printer power switch.

Your printer doesn't print, and it's the first time you've tried to print anything with that particular application.

The computer is sending information to the printer in a form the printer can't deal with. You're using either the wrong baud, the wrong number of data bits or stop bits, or the wrong kind of parity.

Check the manual that came with your printer to see how your printer expects to receive data from the computer, and then use that information to answer printer-specification questions in the application. If your application doesn't ask for your printer's specifications, use the information to reconfigure the printer port by using the Control Panel Program.

You get a line of meaningless characters that bears no resemblance to your document.

You're using either the wrong baud, the wrong number of data bits or stop bits, the wrong kind of parity, a loose cable, or the wrong cable.

First check the tightness of the cable because that's the easiest thing to adjust. If that's not the problem, check the manual that came with your printer to see how your printer expects

to receive data from the computer, and then use
that information to answer printer-specification questions in the application. If your
application doesn't ask for your printer's specifications, use the information to reconfigure
the printer port by using the Control Panel Program. If you're sure your printer specifications
are right, take your cable to your authorized Apple dealer and make sure it's the right kind.

Trouble With the Modem

Every character appears twice on the screen when you're sending a message.

Your computer is echoing every character you send on the screen, and the other
computer is echoing every character it receives back to your screen.

Change the Echo setting to No by using the Control Panel Program or the communications
application.

A line of meaningless characters appears on the screen when you send or receive
messages over phone lines.

The computer on the other end of the phone line is sending information to your
computer in a form your computer isn't set up to receive.

You're using either incompatible bauds or incompatible data formats (the wrong
number of data bits or stop bits, or the wrong kind of parity). Check the documentation
furnished by the information service to see what specifications the other computer is using,
and then change the way your computer is set up to
exchange information by using your communications application or the Control Panel Program.

Characters are lost during information exchange.

There is too much distortion on the phone lines to transmit information at
the speed you're using.

Change to a lower baud, if possible, on both the sending and the receiving end.

Information sent through the modem doesn't appear on your screen.

The other computer isn't echoing information back to your computer. It's a half-duplex modem.

Change the Echo setting to Yes by using the Control Panel Program or the communications
application.

Appendix C - Apple II Family Differences

Every enhancement of the Apple II computer has been designed to be as compatible as possible
with earlier models.

The Apple IIgs has more memory and more features than any of the models that came before it,
but those features are implemented in such a way that you can use most of the software
developed for earlier machines. Keep in mind, though, that if an application was developed for
earlier models of the Apple II, it won't take advantage of the features of later models.

For example, the Apple II Plus keyboard generated only uppercase characters, so applications developed for that model recognize only uppercase characters. You can run Apple II Plus applications on your Apple IIgs, but you have to remember to type everything in uppercase letters. Conversely, if an application is designed to take advantage of Apple IIgs-specific features, it may not work on earlier Apple II's. If compatibility with other Apple II's is important, choose applications that are advertised as compatible with the Apple IIgs, Apple IIc, and Apple IIe.

This chapter summarizes the differences between the various models of the Apple II family so you can anticipate and cope with differences that affect the way software looks and works.

Keyboard

Applications designed for the Apple II Plus won't recognize lowercase characters. Press Caps Lock and the application should run just fine.

The Apple II Plus didn't have Delete, so applications designed for it won't respond when you press Delete. The application will tell you some other way of deleting characters. (Usually it will involve pressing Left Arrow.)

The Apple II Plus didn't have Up Arrow or Down Arrow, so applications designed for it won't move the insertion point up or down when you press those keys. The application will tell you some other way of moving the insertion point up and down.

Applications designed for the Apple IIe or Apple IIc may refer to a Solid Apple key or the Apple key. This key has been replaced on the Apple IIgs with Option. When an application tells you to press he Apple key (usually in combination with some other key), press Option instead.

Display

The Apple IIgs supports a super-high-resolution graphics mode that differs from earlier graphics modes in the concentration of dots and the range of colors that can be assigned to each dot.

Applications designed for earlier models of the Apple II will work fine on the Apple IIgs, but won't use the super-high-resolution mode. They will use low resolution, high resolution, or double-high resolution.

40 Columns Versus 80 Columns

The standard display on the Apple II Plus was 40 columns, so applications developed for it will be displayed in 40 columns even if you selected 80 columns as your standard display by using the Control Panel Program.

MouseText

There is a chip on the main circuit board that generates the characters that are displayed on the screen. The character generator on the Apple IIgs (and on the Apple IIc and later models of the Apple IIe) can generate 32 special characters (little apples, check marks, checkerboards, and so on) in addition to standard characters like letters, numbers, and punctuation marks. The 32 special characters are called MouseText because they are used mostly in mouse-based applications.

Applications designed for earlier models of the Apple II won't take advantage of these special characters—at least not intentionally. But you may notice little apples and check marks in place of uppercase inverse characters if you use older applications.

The original Apple II character generator ROM had two identical sets of uppercase inverse characters, one of which was unnecessary. In the new character generator, the redundant set of uppercase inverse characters has been replaced with MouseText characters. This doesn't have any effect on the way the application works, so if it doesn't bother you, go ahead and use the application. If it does bother you and you'd like an upgraded version, see your authorized Apple dealer or contact the developer of the application.

Peripheral Devices

Applications designed for those models of the Apple II that don't have ports may ask which slot your printer, modem, or disk drive is connected to. You can use these applications even if your peripheral devices are connected through ports as long as you know which port corresponds to which slot.

Slots and ports

Slot	Port
Slot 1	Printer port
Slot 2	Modem port
Slot 3	Text display
Slot 4	Mouse port on keyboard
Slot 5	3.5-inch disk drive in disk drive port
Slot 6	5.25-inch disk drive in disk drive port
Slot 7	AppleTalk in printer port or modem port

The Apple IIc has a built-in disk drive, so applications developed for it may ask you whether you want to save a document on the disk in the built-in drive or on the disk in the external drive. You can use these applications on the Apple IIgs just think of drive 1 as your built-in drive and drive 2 as your external drive.

Applications designed for the Apple IIc may refer to an 80/40 switch because the Apple IIc has a switch on the case that you use to alternate between an 80-column and a 40-column display. The Apple IIgs doesn't have a switch, but you can change from an 80-column to a 40-column display by using the Control Panel Program, explained in Appendix A.

Applications designed for the Apple IIe that require 128K may tell you that you need an extended 80-column card. The Apple IIgs has all the functions of the extended 80-column card built-in (and then some), so don't rush out and buy one.

Memory

The Apple IIgs has 256K RAM standard; that's more built-in memory than the Apple IIc or Apple IIe and much more than the Apple II Plus. You can use applications designed for Apple II's with less memory, but applications designed to take advantage of the Apple IIgs's 256K memory won't run (or won't run the same way) on earlier models of the Apple II. Keep this in mind if you plan to share applications with friends or business associates who have other models of the Apple II.

Apple II Plus

Display Columns: 40; expandable with 80-column card in slot 3.

Resolution: low (16 colors, 40 by 48); high (6 colors, 280 by 192).

Keyboard: Uppercase only; no Up or Down Arrow or Delete.

Memory: 48K; expandable to 64K with language card in slot 0.

Microprocessor: 6502.

Peripheral Devices: 8 slots: 7 general-purpose, 1 for language card.

Apple IIe

Display Columns: 40; expandable with 80-column card in AUX.CONNECTOR slot.

Resolution: low (16 colors, 40 by 48); high (6 colors, 280 by 192); double-high (16 colors, 560 by 192).

Keyboard: Uppercase and lowercase. Newest models have numeric keypad.

Memory: 64K; expandable to 128K with extended 80-column card in AUX.CONNECTOR slot.

Microprocessor: 6502 on original Apple IIe. 65C02 on enhanced and current Apple IIe; its instruction set is a superset of the 6502's with 27 additional instructions.

Peripheral Devices: 8 slots: 7 general-purpose, 1 for 80-column auxiliary memory card.

Apple IIc

Display Columns: Switch on case can be set to 40 or 80.

Resolution: low (16 colors, 40 by 48); high (6 colors, 280 by 192); double-high (16 colors, 560 by 192).

Keyboard: Uppercase and lowercase. Switch on case can be set to Dvorak or standard keyboard layout.

Memory: 128K.

Microprocessor: 65C02; its instruction set is a superset of the 6502's with 27 additional instructions.

Peripheral Devices: Ports for serial printer,modem, monochrome or color monitor, 3.5-inch or 5.25-inch drive, mouse, joystick, or hand controls. No slots.

Apple IIgs

Display Columns: 80 or 40, selectable with Control Panel Program.

Resolution: low (16 colors, 40 by 48); high (6 colors, 280 by 192); double-high (16 colors, 140 by 192); super-high (4 colors, 640 by 200; 16 colors, 320 by 200).

Keyboard: Uppercase and lowercase. Detached keyboard with numeric keypad.
Option replaces the Apple key but generates same code. Choice among standard, Dvorak, and eight international keyboard layouts with Control Panel Program.

Memory: 256K standard 128K for Apple II emulation, 128K for enhancements. Applications in

65C816 mode (that is, not emulating Apple II) can use most of the 256K. Memory expansion card can add from 1 to 8 megabytes in increments of 256K.

Microprocessor: 65C816; can emulate 6502.

Peripheral Devices: 8 slots: 7 general-purpose, 1 for memory expansion card. Ports for serial printer, modem, monochrome and analog RGB color monitors, 3.5-inch and 5.25-inch drives, mouse, joystick, hand controls, and AppleTalk.

Glossary

access: To get information from something like a disk or an information service.

accounting software: A type of application that lets you keep track of accounts payable, accounts receivable, inventory, and so on.

acoustic-coupler modem: A type of modem with a cradle that uses a standard telephone handset for transmission. See also direct-connect modem.

activate: To make a nonactive window active by clicking anywhere inside it.

active window: The frontmost window on the screen; the window where the next action will take place. The active window's title bar is highlighted.

adventure game: A type of game that places you in a fantastical situation and challenges you to reason your way out of simulated trouble into simulated wealth or happiness.

American Simplified Keyboard: See Dvorak keyboard.

analog signal: A signal that varies continuously over time rather than being sent and received in discrete intervals. Compare digital signal.

AppleCare: Apple's fixed-cost, extended carry-in service plan.

Apple Desktop Bus: A port for connecting the keyboard, the Apple Desktop Bus mouse, and other Apple Desktop Bus devices to the Apple IIgs. It's called a bus because several devices can ride the same cable.

Apple I: The prototype for the Apple II family of computers; designed by Apple Computer co-founder Steve Wozniak.

Apple II: A family of computers, including the Apple IIgs, IIe, IIc, and II Plus.

Apple IIgs Hardware Reference: A manual that contains detailed descriptions of all the hardware that makes up the Apple IIgs. It's designed for programmers and peripheral-card designers, but not for newcomers to computers.

Applesoft BASIC: The Apple II dialect of the BASIC programming language; it's built into your Apple IIgs. See also BASIC.

application: Software designed for a particular purpose, such as home finance, education, or word processing.

arrow keys: The keys in the lower-right corner of the Apple IIgs keyboard that you can press (in most applications) to move the cursor (insertion point) in the direction indicated.

art application: An application for drawing.

ASCII: Acronym for American Standard Code for Information Interchange; pronounced ASK-ee. A communications code that defines the representation of letters, numbers, and punctuation marks.

assembly language: A programming language very close to the language of electrical impulses that is the Apple IIgs's native tongue. Because assembly-language programs require very little translation, they can be very fast.

auto-repeat: To happen again and again. The keys on the Apple IIgs keyboard are auto-repeat keys: if you hold one down, the computer will keep generating that character automatically.

backspace: To move the cursor to the left.

backup copy: A duplicate of a disk. Making a backup copy of a disk is like making a photocopy of a paper document.

BASIC: Acronym for Beginners All-purpose Symbolic Instruction Code. The most popular language for personal computers; a version of it is built into your Apple IIgs.

baud: The rate of transmission used in exchanging information between a computer and its peripheral devices.

BBS: See bulletin board system.

binary numbering system: A system in which every number is expressed as a combination of zeros and ones. It's perfectly suited to computers because the computer's microprocessor is made up of switches like light switches that can be either on or off. On is represented as the number 1; off as 0.

bit: Contraction of the words binary and digit. The smallest item of useful information a computer can handle. Usually represented as a 1 or a 0. Eight bits equal one byte.

bits per second: Abbreviated bps. The rate of transmission used in exchanging information between a computer and its peripheral devices.

boot: See start up.

bps: See bits per second.

buffer: An area of memory where information is kept until the computer or a peripheral device is ready to deal with it sort of an overflow tank for the microprocessor.

bug: An error in an application or a problem with hardware. The expression comes from the early days of computing when a moth flew into a room-size computer and caused a breakdown.

bulletin board system: Abbreviated BBS. A computerized version of the bulletin boards frequently found in grocery stores places to leave messages and to advertise things you want to buy or sell. One thing you get from a computerized bulletin board that you can't get from a cork board is free software. See public-domain software.

business graphics application: An application that lets you analyze numerical information in a visual way.

button: The raised area on top of the mouse. You press it when you want to choose from a menu or perform other activities in mouse-based applications. Also, in mouse-based applications, a rectangle with rounded corners and a word inside that you click to designate, confirm, or

cancel an action.

byte: A sequence of eight bits that represents an instruction, a letter, a number, or a punctuation mark.

C: A programming language that makes it relatively easy for programmers to adapt applications designed for one type of computer for use on others.

CAI: See computer-aided instruction.

Caps Lock: A key that you can lock into place so that subsequent letters you type will come out capitalized. Caps Lock doesn't affect nonalphabet keys.

card: A circuit board that you can plug into a slot inside the Apple IIgs to expand the computer's memory or give it the means to communicate with a hard disk, a braille printer, or some other peripheral device.

carriage return: Abbreviated CR. A nonprinting character that tells the computer or printer to end a line of text and start a new one. It's used to end paragraphs. Even though you can't see them, you can delete carriage returns the same way you delete other characters.

case: The outer covering of the computer.

catalog: See directory.

CD ROM Player: Stands for compact disc. A device that reads information from a super-high-capacity disc (550 megabytes and more) by using laser technology. Like a phonograph record, you can play the disc, but you can't record information on it.

cell: The intersection of a row and a column in a spreadsheet. A cell can hold a number, label, function, or formula.

character: A letter, number, or other symbol.

character generator: The integrated circuit responsible for printing characters on the screen.

character set: The letters, numbers, and symbols that can be generated by pressing keys on a keyboard.

chip: A small silicon wafer containing thousands of microscopic components. See also integrated circuit.

choose: To pick a command from a menu. Usually you do this after selecting something for the Apple IIgs to act on.

circuit board: See main circuit board.

circuitry: A network of wires, chips, resistors, and other electronic devices and connections.

Clear: A key on the numeric keypad. Pressing Clear works the same as pressing Control-X. Pressing Control-X while writing a BASIC program cancels the line you're typing.

click: To position the pointer on something, then press and quickly release the mouse button.

clip art application: Electronic pictures that you can clip from one disk or document into another. You can buy disks of clip art and use these professional-quality drawings to illustrate your documents.

Clipboard: A special part of memory that stores the most recent thing you cut. You can paste the contents of the Clipboard into other parts of your document.

clock rate: The rate at which bits move from one internal computer component to another.

close box: The small box on the far-left side in the title bar of an active window. Clicking a close box closes the window.

COBOL: Acronym for COmmon Business-Oriented Language. A business-oriented programming language especially suited to applications involving large amounts of data.

column: A way of designating the number of characters that fit on the computer's display. A column is one character wide.

command: A word or character that causes the computer to do something.

communications software: An application that makes it possible to exchange information with other computers.

compatibility: The condition under which devices can work with each other.

composite: A video signal that includes both display information and the synchronization (and other) signals needed to display it. There are monitor ports on the Apple IIgs for an NTSC composite monitor (one that accepts signals that conform to the standards set by the National Television Standards Committee) and for an analog RGB monitor.

computer: A machine that processes words and numbers faster than a food processor can slice potatoes. Not particularly creative or intuitive, but very good at repetitive tasks.

computer-aided instruction: Abbreviated CAI. Learning math, history, home economics, or almost anything else with the help of a computer application.

computer system: A collective term for the Apple IIgs and everything attached to it.

configuration: A general-purpose computer term that can refer to the way you have your computer set up (that is, the devices you have attached to it) or to the way you have your computer set up to send information to a printer, a modem, or some other peripheral device.

connect time: The amount of time you spend accessing an information service.

construction set: An application that lets you design and build things like games and machines.

contrast knob: A control on your video display that lets you adjust the contrast between the light and dark on the screen.

Control: A key on the Apple IIgs keyboard that, when pressed in conjunction with another key, makes the other key behave differently. It controls
the operation of other keys.

controller card: An interface card that tells your Apple IIgs how to work with one or two disk drives.

Control Panel Program: A program built into the Apple IIgs that lets you set the time of the built-in clock and tailor certain aspects of your computer system to suit your individual preferences like the color of text and background on the screen, the volume of the built-in speaker, and more.

co-processor: A microprocessor on a card that overrides or works with the microprocessor on the main circuit board.

copy-protect: To prevent someone from duplicating the contents of a disk. Compare write-protect.

courseware: Educational software.

CP/M: Stands for Control Program for Microprocessors. An operating system that works with the Z80 microprocessor.

CR: See carriage return.

cursor: A blinking underline, rectangle, or other symbol that marks your place on the screen. It shows you where your next action will take place. Compare pointer.

cut: To remove text or pictures from a document by using the Cut command. The most recent clipping is stored on the Apple IIgs's Clipboard so you can paste it somewhere else if you want.

cut and paste: To move something from one place in a document to another. It's the computer equivalent of using scissors to clip something and glue to paste the clipping somewhere else.

daisy wheel printer: A type of printer that produces professional-looking, letter-quality documents.

data: Information, especially raw or unprocessed information.

data base application: A type of application that helps you keep track of lists of information. It makes it easy to recall, update, and cross-reference information.

data bits: The form in which the computer sends and receives information as a string of bits.

data disk: A disk that contains your work letters, budgets, pictures, and so on.

DCD: Stands for Data Carrier Detect. A handshake signal used to regulate the flow of data between the computer and a peripheral device.

default: A preset response to a question in an application. The response is used by default unless you supply an alternative.

Delete: A key that you can press (in some applications) to erase the character to the left of the cursor.

desk accessory: A mini-application that you can use without leaving your main application.

device: See peripheral device.

digital signal: A signal that is sent and received in discrete intervals. Compare analog signal.

digitizer: A peripheral device that takes a photo and converts the image into a form that the computer can process, save on a disk, display on the screen, or print.

direct-connect modem: A modem that you plug directly into a phone jack. The advantage of a direct-connect modem over an acoustic-coupler modem is that the phone signals don't have to

travel through the handset, so there's less distortion. See also acoustic-coupler modem.

directory: A list of all the files on a disk. Sometimes called a catalog. See also subdirectory.

disk: A circular plastic object coated with iron oxide. You can buy applications prerecorded on disks, and you save your work on blank disks. Disks come in different sizes for use with different types of disk drives. See 5.25-inch disk, 3.5-inch disk, and hard disk.

disk drive: A device that loads information from a disk into the memory of the computer and saves information from the memory of the computer onto a disk.
disk drive controller card: A circuit board that provides a connection between the Apple IIgs and one or two disk drives.

disk drive light: A light that comes on when your disk drive is loading from or storing on a disk. Sometimes called an in-use light. When the light is off, it's safe to put disks in or take disks out. When the light is on, don't remove the disk inside.

disk operating system: See operating system.

display: A general term to describe what you see on your screen when you're using a computer.

document: Information you create with a computer program. It could be a memo, a picture, a budget. Also called a file.

DOS 3.2: Stands for Disk Operating System. An early Apple II operating system; 3.2 is the version number.

DOS 3.3: One of three operating systems used by the Apple IIgs; 3.3 is the version number.

DOS 3.3 System Master: A disk that used to be packed with 5.25-inch disk drives. It performed some of the functions now handled by the Apple IIgs System Disk. It has programs for initializing disks, for copying DOS 3.3-based applications and documents, and more.

dot matrix printer: A type of printer that forms characters with patterns of dots.

double-click: To position the pointer where you want an action to take place, and then press and release the mouse button twice in quick succession without moving the mouse.

double-high resolution: A graphics mode that can display information using a rectangular array of 560 horizontal by 192 vertical dots for black and white and 140 horizontal by 192 vertical dots for 16 colors.

Down Arrow: A key that you can press (in some applications) to make the cursor move down one line.

download: To send a file from one computer to another.

drag: To position the pointer on something, press and hold the mouse button, move the mouse, and release the mouse button. When you release the mouse button, you either highlight a selection or move an object to a new location.

drill-and-practice application: A type of educational application that presents information, tests your retention of the material, and gives feedback based on your answers.

drive: See disk drive.

drive number: An application might ask you to distinguish between disk drives by number. Drive 1 is the drive of its type connected closest to the computer or to the connector labeled Drive 1 on a disk drive controller card. Drive 2 is the drive of its type connected to drive 1 or to the connector labeled Drive 2 on a disk drive controller card.

drive 1: The disk drive where you put the application program disk you want to start up.

drive 2: See drive number.

DSR: Stands for Data Set Ready. A handshake signal used to regulate the flow of data between the computer and a peripheral device.

DTR: Stands for Data Terminal Ready. A handshake signal used to regulate the flow of data between the computer and a peripheral device.

duplex: See full-duplex modem and half-duplex modem.

Dvorak keyboard: A keyboard layout designed to increase typing speed and efficiency by locating the keys used most often in the home row. Also called the American Simplified Keyboard.

echo: A copy on your own screen of a message you send via a modem. The echo can come from the remote computer (the computer on the other end of the phone line) or from your own computer.

Edit menu: A menu in most mouse-based programs that lists editing commands like Copy, Cut, and Paste.

educational software: Software that teaches something. Also called courseware. See also computer-aided instruction.

8-bit processor: A processor that can address 65,536 memory locations directly.

80-column card: An interface card that made it possible for earlier models of the Apple II to display text in 80-column form instead of the standard 40-column form.

80-column display: The number of characters per line that are displayed on the screen. The options are 40 and 80 columns.

eject: To remove a disk from a disk drive.

electronic mail: Abbreviated E-mail. A message sent from one computer with a modem to another computer with a modem over phone lines.

E-mail: See electronic mail.

Enter: A key on the numeric keypad that usually has the same function as Return; that is, it confirms a choice or tells a program you're ready to proceed.

error message: The computer's way of alerting you to a failure in the communication process; often accompanied by a beep.

Esc: A key you can press (in some applications) to get back to the menu or to cancel a procedure that's in progress.

even parity: An error-checking system in which the sending device adds an extra bit set to 0 or 1 as necessary to make all the 1 bits add up to an even number. The receiving device adds the 1 bits and if the total is an even number, it assumes the message came through intact.

extended 80-column card: An interface card used in other models of the Apple II that adds 64K of memory and makes it possible for the computer to display information in 80-column format instead of the standard 40-column format.

field: A word you'll run across in data base applications and ads for data base applications. It refers to a category of information. If your data base is an address book, name and address will be two of the fields.

file: A collection of information that you store on a disk. Also called a document.

file management: A general term for copying files, deleting files, and for other housekeeping chores involving the contents of disks.

file menu: A menu in mouse-based applications that lists commands that affect whole documents commands like Save, Print, and Quit.

filename: The name you give your file (document) before you save it on a disk.

firmware: Another name for the programs in ROM (read-only memory). It's more permanent than the software in RAM (random-access memory) thus the name.

5.25-inch disk: A disk 5.25 inches in diameter that you can use with the Apple IIgs. For many years, the only type of disk you could use with Apple II computers. It can store 143K of information (about 70 pages of text). Compare 3.5-inch disk.

folder: An icon that represents a subdirectory. A way to group related documents together on a disk.

font: Size and style of characters (bold, italic, and so on).

footer: Text that appears at the bottom of every page or every other page in a document. Compare header.

format: To divide a disk into sections where information can be stored. Disks must be formatted before you can save information on them. Also called initialize.

form feed: The way perforated printer paper is pulled into position for printing. Compare friction feed.

formula: An equation. By writing formulas to define relationships between the various numbers in your spreadsheet, you can try out different numbers, and the formulas will recalculate all the totals for you.

FORTH: A programming language.

Fortran: A programming language.

40-column display: The number of characters per line that are displayed on the screen. The options are 40 and 80 columns.

free-form data base: A data base that lets you enter information in paragraph form (instead of by categories) and designate key words that you can search for later.

friction feed: The way a printer moves individual sheets of paper into position for printing. It's the same way typewriters move paper into position. Compare form feed.

full-duplex modem: A modem that echoes information it receives back to the sending computer.

Most commercial information services are full-duplex.

function: A built-in formula you can use to calculate an average, a square root, and the like.

function key: A key that tells the application to carry out a particular activity or function (print a document, save a document, and so on). Some applications use the number keys on the numeric keypad as function keys.

garbage: A string of meaningless characters that bears no resemblance to your document. It's an indication that your computer and peripheral device are using different bauds or data formats.

graphics: Information presented in the form of pictures or images.
graphics mode: A way of displaying text and graphics on the screen. In graphics mode, images are formed by patterns of dots.

graphics tablet: A device for drawing pictures. A special pen sends out signals that are detected by wires in the tablet and sent as X and Y coordinates to the screen.

hacker: A person who is on a first-name basis with RAM, ROM, and the microprocessor. A person who'd rather write application programs than use store-bought programs.

half-duplex modem: A modem that does not echo information it receives from the sending computer.

hand controls: Computer accessories used mainly in games to move creatures and objects. Also used in simulation applications.

handshake signal: A signal that regulates the flow of data between the computer and peripheral devices.

hard disk: A storage device that can hold the equivalent of dozens of 3.5-inch disks.

hardware: Those parts of the computer that you can see and touch. The computer and the machines that attach to it: the disk drive, printer, and other peripheral devices. Compare software.

header: Text that appears at the top of every page or every other page of a document. Compare footer.

highlight: To select something on the screen to distinguish it from other choices.

high resolution: A graphics mode that can display information using a rectangular array of 280 horizontal by 192 vertical dots.

home computer: A computer, like the Apple IIgs, that is small enough and affordable enough to have in your house. (When you take a home computer to the office, it becomes a productivity tool.)

home control device: A device that can regulate the temperature of your home, turn lamps on and off, or monitor smoke detectors and burglar alarms.

home finance application: An application that helps with budgeting, portfolio management, tax planning, and so on. Like a spreadsheet, only easier to use.

home row: The row of keys on the keyboard where the fingers of touch typists rest when they aren't reaching for other keys. In the standard keyboard layout, the home row contains A, S, D, F, G, and so on. In the Dvorak keyboard layout, the home row contains what August Dvorak determined were the most frequently used keys (A, O, E, U, I, and so on).

icon: A symbol like the one on the back panel of the computer that shows you where to plug in the monitor or a symbol on the screen that represents a disk, a document, or something else you can select.

information service: A large data base that you can subscribe to for news, stock quotes, and other services.

initialize: See format.

input: Information traveling into the computer (like keypresses and mouse moves).

input/output: Abbreviated I/O. Refers to the means by which information is sent between the computer and its peripheral devices.

insertion point: The place where your next action will take place.

integrated circuit: An electronic circuit including components and interconnections entirely contained in a single piece of semi-conducting material, usually silicon. Often referred to as a chip.

integrated software: A group of application programs, usually on one disk, designed to share data.

interface: Hardware or software that links the computer to a device.

interface card: A circuit board you plug into one of the slots in the Apple IIgs to link the computer to a peripheral device.

inverse characters: Inverse means opposite. If characters ordinarily show up as light characters on a dark screen, inverse characters would show up as dark characters on a light screen. Inverse is one form of highlighting.

I/O: See input/output.

I/O error message: Stands for input/output. A message you get when there's a problem with the way information is being exchanged with peripheral devices.

jacket: A square of plastic that protects a 5.25-inch disk. You don't remove the jacket (and expect to ever use the disk again).

joystick: A peripheral device that moves creatures and objects in games.

K: Stands for kilobyte. The unit of measurement for computer memory: 1 K equals 1024 bytes, and it takes one byte to make one character. The Apple IIgs has 256K of RAM (random-access memory), expandable by 1 to 8 megabytes with a memory expansion card, and 128K of ROM (read-only memory).

keyboard: One way to communicate with the computer. It looks like the keyboard on a typewriter, but programmers can make the keys do anything they want them to.

keyboard-based application: An application that accepts input from a keyboard.

keyboard buffer: A special part of memory where keypresses are stored until the computer is ready to act on them.

keypad: See numeric keypad.

key word: A word you designate when you're entering data (information) into certain kinds of data base applications. Later, when you want to retrieve that information, you type the key word.

kilobyte: See K.

label: A strip of paper you stick on a disk to identify it.

language card: An interface card with 16K RAM that can be connected to a 48K Apple II Plus so the computer can operate in Integer BASIC (the first dialect of BASIC available for the Apple II computer) and Applesoft BASIC.

laser printer: A printer that produces typeset-quality printing using laser technology.

Left Arrow: A key you can press (in most applications) to move the cursor one character to the left. In some applications, as the cursor moves to the left, it erases characters.

letter quality printer: See daisy wheel printer.

LF: See line feed.

light pen: A peripheral device shaped like a pen that sends instructions to the computer when you point to choices on the screen. It works only with applications designed to receive input from the light pen.

line break: The end of a line of text on the screen or on a printed page. You can force a line break by pressing Return, or you can let the application break lines for you.

line feed: Abbreviated LF. An advance to the next line.

LISP: A programming language.

load: To read data or programs into the computer from a disk.

Logo: A computer language that encourages learning through discovery. Easy and fun to learn, but powerful enough for serious programming.

log on: To establish contact with a computerized information service or other remote computer.

low resolution: A graphics mode that can display information using a rectangular array of 40 horizontal by 48 vertical blocks.

machine language: The binary language of 1's and 0's that is the only language the computer understands. All other programming languages, like BASIC, have to be translated into this binary code before the computer can understand them.

macro: A command defined by you (user-defined) that tells the application to carry out a series of commands when you type the macro.

mail-merge application: An application that takes names and addresses from a data base and puts them into form letters.

main circuit board: A large circuit board that holds RAM, ROM, the microprocessor, custom integrated circuits (chips), and other components that make the computer a computer.

main menu: The first menu you see in keyboard-based applications. It presents the application's

top level of options.

mass storage device: A device, like a hard disk, that can store the equivalent of dozens of disks.

megabyte: A million bytes a unit of measurement that comes in handy when you're describing the capacity of CD ROMs, which can store more than 550 megabytes.

megahertz: Abbreviated MHz. One million cycles per second.

memory: Integrated circuits (chips) that store instructions for the microprocessor. There are two kinds of memory: temporary memory (called random-access memory RAM) and permanent memory (called read-only memory ROM). The contents of RAM disappear when you turn off the power; the contents of ROM do not.

memory expansion card: An interface card that you can connect to the memory expansion slot in the Apple IIgs to increase the memory by 1 to 8 megabytes.

menu: A list of choices.

menu bar: In mouse-based applications, the horizontal strip at the top of the screen that contains menu titles.

menu title: A word, phrase, or picture in the menu bar in mouse-based programs that designates one menu. When you point to a menu title and hold down the mouse button, you can see what's on the menu.

MHz: See megahertz.

microprocessor: The brain of the computer the processor of information. The Apple IIgs has a 65C816, 16-bit microprocessor.

MIDI: Stands for Musical Instrument Digital Interface. A software and hardware standard set by the music industry that allows different electronic instruments to communicate with each other and with computers.

MIDI card: An interface card that lets you use your Apple IIgs as a music synthesizer or as a control device for electronic musical instruments.

mode: A state that determines the computer's behavior.

modem: Short for modulator/demodulator. A device that links your computer to another computer or an information service over phone lines.

Modula-2: A programming language.

monitor: Like a television set without channels. It displays instructions from the application to you and shows what you've typed into memory.

monochrome monitor: A black-and-white, amber-and-black, or green-and-black monitor.

mouse: The small device you roll around on a flat surface next to your computer. When you move the mouse, the pointer on the screen moves correspondingly.

mouse-based application: An application that accepts input from a mouse.

mouse button: The button on top of the mouse. You press it to choose from menus or when you

want to move items around on the screen.

MouseText: Special characters, like check marks and little apples, used in mouse-based applications.

MS-DOS: The operating system for applications designed to run on IBM and IBM-compatible personal computers.

music application: An application that can teach you how to read music or help you compose music.

music synthesizer: A device that can generate a variety of sounds, including those of traditional musical instruments.

network: A bunch of computers linked together so they can share information and peripheral devices.

NTSC composite color monitor: The standard video format defined by the NTSC, the National Television Standards Committee.

numeric keypad: The number keys, on the right side of the Apple IIgs keyboard, that are laid out like the keys on an adding machine. You can use them interchangeably with the number keys on the top row of the keyboard.

odd parity: An error-checking system in which the sending device adds an extra bit set to 0 or 1 as necessary to make the total of 1 bits add up to an odd number. The receiving device adds the 1 bits and if the total is an odd number, it assumes the message came through intact.

on-line: The condition of a device being connected or of data being accessible to the computer.

open architecture: A computer that has an open-lid policy it invites add-on devices.

operating system: An application that, among other things, controls the way information is loaded into memory, the way the computer works with the information, the way information is stored on a disk, and the way the computer communicates with a printer and other peripheral devices. ProDOS, DOS 3.3, and Pascal are three operating systems available for the Apple IIgs.

Option key: A key on the Apple IIgs keyboard that, when pressed in conjunction with another key, creates a special effect. On other models of the Apple II, this key is labeled Apple.

output: Information traveling out of the computer.

parallel device: A printer or other device that sends and receives data eight bits at a time over eight parallel wires. Compare serial device.

parallel interface: The condition of a computer and a peripheral device exchanging information eight bits at the same time along eight parallel wires. Compare serial interface.

parity: A way of checking data to make sure bits of data didn't get lost or garbled during transmission. See even parity and odd parity.

Pascal: A programming language taught in high school and college computer-science courses because it stresses a systematic approach to problem solving.

password: A secret word that gives you, but no one else, access to your data or to messages sent to you through an information service.

paste: To put a copy of the contents of the Clipboard whatever was last cut or copied at the insertion point.

pathname: The complete name of a document beginning with the name of the disk (also called the volume name), the name of the subdirectory it's in (if it's in one), and the name of the document. The pathname begins with a slash, and the parts of the pathname are separated with slashes. It's called a pathname because it describes the route to the document.

peripheral: See peripheral device.

peripheral device: A device that is connected to the computer, like a printer or a modem.

PILOT: Acronym for Programmed Inquiry, Learning, Or Teaching. A programming language that lets teachers design their own educational software.

pinfeed paper: A stack of attached, perforated sheets designed to feed into a printer without much human intervention.

pixel: Contraction of the words picture and element. In graphics mode, text and graphics are formed by patterns of dots called pixels.

PL/1: A complex, but flexible programming language said to combine the best features of Fortran, a programming language suited to scientific applications, and COBOL, a programming language suited to business applications.

plotter: A device that prints charts and graphs by means of pens whose movements are programmed.

pointer: A marker that moves across the screen when you move the mouse across your desk (in mouse-based applications). Compare cursor.

port: A connector on the back panel of the Apple IIgs for connecting peripheral devices.

power light: A light that tells you whether or not the Apple IIgs is on.

power strip: A device that plugs into one three-hole, grounded outlet, but that can accommodate four or six three-pronged plugs. A must if you have more than two devices that need to be plugged into a grounded, three-hole outlet.

power switch: A rocker switch on the back of the computer that you switch on when you want to use your computer.

prefix: The first part of a pathname the name of the disk and, if you like, the name of a subdirectory. Applications that ask you to type a pathname usually let you set a prefix so you don't have to type the complete pathname every time you want to work with a document on a particular disk or in a particular subdirectory. Once the prefix is set, all you do is type the rest of the pathname.

press: (1) To position the pointer on something and then hold down the mouse button without moving the mouse. (2) To hold down a key on the keyboard.

print buffer card: A card that plugs into a printer interface card that lets your Apple IIgs send an entire document to the printer at one time so you can use your computer for other things while the document is being printed.

printer: A device that produces a paper copy of the information you create using the computer.

ProDOS: Stands for Professional Disk Operating System which is the primary operating system for the Apple IIgs. ProDOS 8 and ProDOS 16 refer to versions of ProDOS designed for 8- and 16-bit microprocessors respectively. See also operating system.

program: (v.) To write instructions for the computer to talk to the computer in terms it understands. (n.) A set of instructions that tells the computer what to do.

program disk: A disk that contains an operating system and a self-starting application program.

programmer: A person who writes computer programs.

program selector: A program that lets you switch application programs without restarting the computer.

prompt: A character displayed on the screen to prompt the user to take some action. For example, a bracket prompt character is used in the Applesoft BASIC programming language.

public-domain software: Software that is free for the taking. You can get it at users-group meetings or through computer bulletin boards.

pull-down menu: A menu that is hidden until you press on its title with the mouse.

radio-frequency (RF) modulator: A device that transforms your television set into a computer display device.

RAM: See random-access memory.

RAM disk: A cross between a disk and random-access memory. Like a disk, it must be formatted before you can put files on it; also like a disk, it must be addressed by its volume name (disk name) or by its slot number. As with RAM, the computer can access the information on it very quickly. Also like RAM, what's stored on it is stored temporarily; when the power is turned off, the information on it is lost.

random-access memory: Abbreviated RAM. Temporary memory. RAM stores applications and data for the microprocessor.

read: To get information from a disk and put it in memory.

read-only memory: Abbreviated ROM. Permanent memory. Applesoft BASIC is stored in ROM along with other programs that regulate communication between the microprocessor and other parts of the computer system.

record: All the information about one person or one thing in your data base.

remote computer: The computer on the other end of the phone line; it can be across the room or across the country. You can use your Apple IIgs, a modem, and a communications application to communicate with a remote computer.

report: A subset of the information in your data base. You may have a data base with information about your employees like their names, addresses, phone numbers, birthdays, social security numbers, and salaries. There are times when you want only a list of names and salaries that's one report. Other times you want names and phone numbers that's another report. You can generate all sorts of different reports from one data base.

Reset: The key with a triangle on it that you can press in combination with Control and Apple key to restart an application.

resolution: The degree of clarity of your display. A monitor has better resolution than a television set used as a monitor. An RGB color monitor has better resolution than a composite color monitor.

Return: A key that you can press to move the cursor to the beginning of the next line. Also used in many applications to accept choices or indicate that you've finished doing something and are ready to proceed.

RF modulator: See radio-frequency modulator.

RGB color monitor: Stands for Red Green Blue. A type of color monitor that can do what is impossible on most types of color monitor display text in color and in 80-column format.

Right Arrow: A key you can press (in most applications) to move the cursor one character to the right.

ROM: See read-only memory.

ROM disk: ROM chips on a memory expansion card that can contain application programs.

row: A way of designating the number of characters that fit on the computer's display.

run: What applications do when the computer is carrying out their instructions.

SAT: Stands for Scholastic Aptitude Test. Colleges use the results of the SAT to decide if a student is college material. There are computer applications that help you prepare for the SAT.

save: To store an application or data on a disk, as opposed to storing it temporarily in the memory of the computer.

scan: What the computer does when you first turn on the power switch. It starts looking (scanning the slots) for a disk drive controller card. It looks first at slot 7 (or the corresponding port); if it doesn't find a startup device there, it proceeds to the next-highest-numbered slot until it finds a startup device.

screen: The part of the monitor where information is displayed. Like a movie screen, it's the place where things are projected.

scroll: To move a document so you can see a different part of it.

scroll arrow: An arrow on either end of a scroll bar. Clicking the scroll arrow moves the document one line. Holding down the scroll arrow causes continuous scrolling.

scroll bar: A rectangular bar that may be along the right or bottom of a window. Clicking or dragging in the scroll bar causes the view of the document to change.

scroll box: The inverse box in a scroll bar. The position of the scroll box in the scroll bar indicates the position of what's in the window relative to the entire document.

search and replace: To look for a particular word or phrase throughout a document and exchange it for another word or phrase you specify.

sector: A part of a track. When disks are initialized for DOS 3.3, they are divided into tracks and sectors.

select: In mouse-based applications, to designate where the next action will take place. To select something, you click on it or drag across it.

Select button: A button on a printer that determines whether the printer should accept data from the computer or instructions from other buttons on the printer control panel (like the line feed button or form feed button).

serial device: A device that sends and receives data one bit at a time over a single wire. Compare parallel device.

serial interface: The condition of a computer and a peripheral device exchanging information one bit at a time along a single wire. Compare parallel interface.

serial port: One of two ports (printer and modem) on the back panel of the Apple IIgs designed for serial devices.

Shift: A key that you can press in combination with another key to get an uppercase letter or the upper character on a two-character key.

simulation: A computerized representation of something in action.

16-bit processor: A processor that can address 16,777,216 memory locations directly.

65C816: The type of microprocessor used in the Apple IIgs.

size box: A box on the bottom-right corner of some active windows that lets you resize the window.

slash: A character used to separate the parts of a pathname.

slide-show option: A feature of some applications that lets you arrange displays in a sequence so you can use them in presentations. The application changes slides after a certain time interval or when you press a certain key.

slot: A long, narrow connector inside the Apple IIgs that lets you connect a printer and other devices to the computer.

slot number: A way an application might ask you to describe the location of a peripheral device. There are seven general-purpose slots on the main circuit board for connecting peripheral devices to the computer. They are numbered from 1 to 7 with 1 on the left as you face the front of the computer. If your device is connected to a port instead of a slot, you can still use the application by typing the slot number that corresponds to the port.

smart port: When devices connected to the disk drive port appear to be connected to a card in slot 5 instead of slot 6, the disk drive port is described as a smart port.

software: Instructions, usually stored on disks, that tell the computer what to do. Compare hardware.

software catalog: A book that describes software.

software pirate: A person who copies applications without the permission of the author.

special-interest application: An application designed for a particular audience diagnostic applications for doctors, crop-rotation applications for farmers, and so on. Also called vertical-market software.

speech synthesizer: An interface card that allows a computer application to imitate human speech.

spreadsheet application: An application that simplifies financial planning, cost estimating, and other number-crunching tasks. It is laid out in columns and rows.

START13: An application on the DOS 3.3 System Master disk that makes it possible to run DOS 3.2-based applications.

start up: To load an application from a disk into the memory of the computer. Also called boot.

startup disk: A disk used to start up the computer.

stop bits: One or two bits that indicate the end of a character.

structured language: A type of programming language in which programs are built out of smaller subprograms. Programs that are planned in advance instead of designed on the fly. Pascal is an example of a structured programming language.

subdirectory: A directory within a directory that usually contains related documents; used to organize the information on large-capacity disks.

subscript: Text that appears slightly lower than the text around it. Compare superscript.

super-high resolution: A graphics mode that can display information using a rectangular array of 640 horizontal by 200 vertical dots in 4 colors or 320 horizontal by 200 vertical dots in 16 colors.

SuperPILOT: An Apple version of the PILOT programming language. See PILOT.

superscript: Text that appears slightly higher than the text around it. Compare subscript.

Super Serial Card: A serial interface card manufactured by Apple Computer, Inc. You don't need to use one with the Apple IIgs because the serial interface is built-in and can be accessed through the printer and modem ports.

syntax: The rules that govern the structure of statements or instructions in a programming language or in an operating system.

syntax error message: A message you get when you misspell a computer command.
synthesizer: See music synthesizer.

SYSOP: See system operator.

system configuration: See configuration.

System Disk: Disk containing applications that copy, delete, rename and in other ways manipulate the information on disks.

system operator: Abbreviated SYSOP. The human operator of a computerized bulletin board.

System Disk: Disk containing an application with programs that copy, delete, rename and in other ways manipulate files and disks.

Tab: A key that, when pressed, moves the insertion point to the next tab marker.

tape backup: A duplicate on magnetic tape of the information on a hard disk. The alternative to tape backup is copying onto a second hard disk (which is pretty expensive) or copying dozens of 3.5-inch disks (which is time-consuming).

telecommunications: The exchanging of information with other computers over phone lines. To telecommunicate, you need a computer, a modem, communications software, and a similar setup on the other end of the phone line. You can telecommunicate with other personal computers or with commercial information services.

template: A form or an electronic overlay. For example, spreadsheet templates allow nonaccountant-types to use spreadsheet applications.

text generator: Firmware that prints characters on the screen in response to keypresses.

text mode: Information that is sent to the display in the form of characters that fit in a 40-column by 24-line grid or in an 80-column by 24-line grid.
thermal transfer printer: A printer that works by heating small points that produce dots on special heat-sensitive paper.

3.5-inch disk: A disk 3.5 inches in diameter. The most common storage medium used with the Apple IIgs. It can store 800K of information (approximately 400 pages of text). Compare 5.25-inch disk.

title bar: The horizontal bar at the top of a window that shows the name of the window's contents and lets you move the window.

track: One of numerous concentric bands into which a formatted disk is divided. Compare sector.

transmitting device: The computer that is sending information.

troubleshooting: Diagnosing a problem and (hopefully) solving it. It's best to get peripheral devices that work automatically with the Apple IIgs so you won't have personal experience with this activity.

turtle: A cursor shaped like a triangle. Using Logo programming commands like FORWARD, BACK, LEFT, RIGHT, you can move the turtle around the screen and create graphics.

Up Arrow: A key you can press (in some applications) to make the cursor move up one line.

user group: A computer club whose members share programs they've written and information they've learned.

user ID: A number that identifies you as a subscriber to an information service.

user interface: The way a computer application communicates with you.

utilities or utility program: A set of applications that controls and manipulates the information on disks.

vertical-market software: See special-interest application.

video monitor: See monitor.

voice input device: A device that translates the spoken word into a form that some software can process.

volume name: The name of a disk or its main directory. Compare pathname.

window: With mouse-based applications, one or more areas on the screen showing one or more documents at a time.

word processing application: A type of application designed to make writing and editing easier and faster.

word wraparound: In some word processing applications, the automatic jump to the start of the next line (bringing the word you're typing with it) when the cursor reaches the right margin, without your pressing Return.

write: To record information on a disk.

write-enable notch: A small, square cutout in the upper-right corner of a 5.25-inch disk or the small, square hole in the upper-right corner of a 3.5-inch disk that indicates whether or not information can be recorded on the disk.

write-protect: To prevent changes to the contents of a disk by covering the write-enable notch on a 5.25-inch disk or by sliding the small, plastic tab to uncover the square hole on a 3.5-inch disk. Compare copy-protect.

write-protect tab: A piece of tape that you can use to cover the write-enable notch on a 5.25-inch disk so information can't be recorded on it. The write-protect tab on a 3.5-inch disk is a small piece of plastic that slides to cover or uncover a square hole in the upper-right side of the disk.

XOFF: An ASCII character that tells the transmitting device to halt transmission.

XON: An ASCII character that tells the transmitting device to resume transmission.

Z80 card: A circuit board containing a Z80 microprocessor. An Apple IIgs equipped with a Z80 card can run programs based on the popular CP/M operating system.